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# **LATIN AMERICA**

## **Countrysides and United Regions**



# LATIN AMERICA

## Countrysides and United Regions

*by*

ROBERT S. PLATT

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*Whittlesey House*

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LATIN AMERICA

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*To*

**ROLLIN D. SALISBURY**  
WHO INSPIRED THE PROJECT

**HARLAN H. BARROWS**  
WHO SAW IT THROUGH

*... and \**  
**HARRIET SHANKS PLATT**  
WHO DID A BETTER HALF OF THE  
FIELDWORK AND PROVIDED  
THE *ambiente simpático*



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# LATIN AMERICA

## Countrysides and United Regions

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# The Project

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This book is a collection of simple field studies in a frame of complex generalizations. It is not a complete geography of Latin America, though its purpose is to enlarge geographic understanding. Here is a consignment of materials to be used in building up a comprehensive structure—generalizations for an outline of design, and detailed studies as building stones to be fitted into place.

The present volume is one result of a project that began twenty years ago in a search for knowledge of Latin America—a search pursued first in the library and then in the field. In the library it was found that available records are incomplete for comprehensive geographic understanding, even though the regions of Latin America have been known to many people in many ways. In the field it has been found that there is no simple formula for acquiring comprehensive understanding by direct observation, even though many facts may be observed.

However, various ways can be found of carrying the geographic record toward completion, and there are suitable means of acquiring geographic knowledge in the field. Accordingly this book has a twofold objective: (1) to contribute to the geographic record some facts and concepts needed for a comprehensive understanding of Latin America but not found in the library when this search began; (2) to contribute to geographic method some evidence on the problem of field study for regional understanding.

**GEOGRAPHER'S DILEMMA.** The latter problem is old and stubborn, arising from the geographer's dilemma in trying to comprehend large regions while seeing at once only a small area. The complex character of great regions, complicated particularly by human appurtenances, which necessarily are included in geographic comprehension, cannot be immediately and totally perceived by one pair of human eyes.

Obviously the problem is not solved merely by withdrawing to a great height, in reality or in imagination, thus extending the view over more area but losing details, some of them essential to geographic com-

prehension. Nor is it solved by counting items and totaling them for the region in arithmetical generalizations. Regional complexities are those, not of an amorphous mass, but of an intricate pattern in which details fit together in significant combinations. Regional understanding involves recognition not only of simple items individually but also of items in association, grouped or organized with relation to each other—recognition, therefore, not only of pounds of coffee, but also of plantations (in which coffee is associated with land types and farm systems) and of national and international economies (in which plantations function).

Making a map solves part of the geographic problem by reproducing areal patterns reduced in size so that regions are seen at a glance. This device touches mainly the latter part of the problem, in which geographic knowledge is recorded and imparted. But maps do not solve the first part of the problem, when field observation is begun in regions not yet fully understood and when features that may be significant for regional understanding must be recognized and selected to be mapped.

All Latin America has been mapped before now for location of prominent features, and major regions have been recognized and outlined, at least tentatively. But the work of recognizing and recording the small features on which the character of regions depends has hardly begun.

The project here reported upon is primarily one of reconnaissance, to recognize and record some of the fundamental details that seem to give character to regions. The field studies focus attention particularly on basic units of human occupancy, chiefly on rural units of economic organization as reflecting, more closely than other common establishments, the characteristics that distinguish one region from another.

Reconnaissance does not allow for complete detailed coverage of large areas, but it does allow for detailed observation at selected spots. The swiftest traveler can see only details and not generalizations from moment to moment. If his eyes do not observe details, they see only passing blurs near by or faint forms in the distance.

**FIELD PLANS.** Accordingly, in this reconnaissance, intimate detail at certain spots provides the substance (Fig. 1). The spots are few and imperfectly spaced; but, within limits set by time and opportunity, each has been selected as representative in certain respects of the area in which it is located, and all together have been taken to exemplify some aspects of the regions of Latin America.

Some of the studies and generalizations have been published in periodicals (as indicated by footnotes) and so have been available to others studying Latin America. Such items in advance of the larger whole are not unrelated essays now collected but have always had a place in plans for the present compilation.

No spot can be perfectly typical of a region, and none of these study sites is to be considered so. Indeed, the studies here presented show that regional character is not fully represented in single glimpses and that

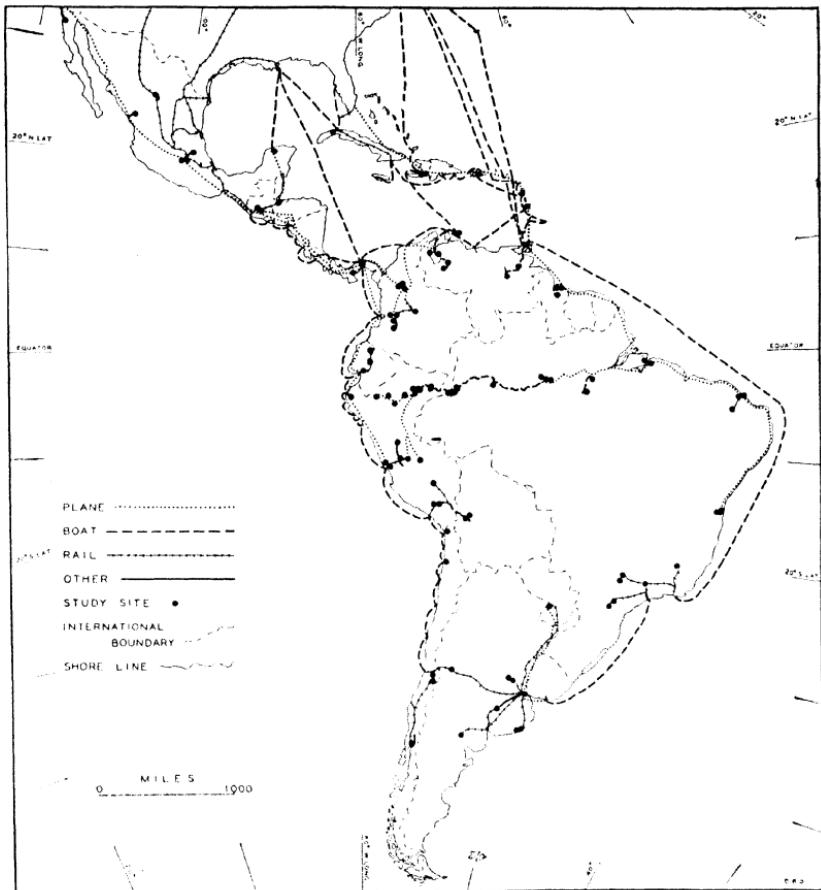


FIG. 1. Traverse routes of the reconnaissance project in Latin America, covered by various means of transport as indicated on the map. Ninety-four study sites shown on the map are described either separately or grouped in Chaps. II to X.; and seven bits of traverse also are separately described. Most of the spots can be identified by reference to corresponding numbers on the regional maps of each chapter.

new cases reveal new characteristics to enrich general concepts of the whole. But these studies have progressed far from the chaotic concepts of sight-seeing, intent on freaks of nature instead of on regional understanding. These items are not isolated and random; all are related to their regions and to each other in a framework of traverse routes,

systematically recorded in the planned procedure of reconnaissance (Fig. 1). Moreover, they fit into a background of geographic literature, representing the combined contributions of many predecessors in Latin America.

Thanks to the framework of traverses and background of literature, the study spots are not left isolated here but are grouped in the general setting of regions and countries to which they belong.

**FIELD PROCEDURE.** The reconnaissance has been done in seven field trips, at intervals through a period of 15 years (1922-1937), each lasting 2 to 6 months, each directed at a different part of Latin America, and thus together touching all of the countries and colonies and most of the regions. Travel has been by any convenient means, preferably by air and by land rather than by water and by day rather than by night.

Field equipment has been simple; field methods have been standardized but flexible enough to take advantage of local aids. Maps at study sites have been made in some cases with plane table, ruler alidade, and stride scale; in other cases, by notebook sketching, with the assistance of local inhabitants; in other cases, from available cadastral surveys supplemented by field observation. Along traverses, mapping has been provided for by following route maps when available; persistently locating data in notations; estimating distance on airways and waterways by speed and time; finding direction by compass in some cases, by sighting on sun or moon in a few cases.

Photographs have been taken unsparingly both at study sites and along traverses, and relevant data have been recorded, particularly with respect to location. Small cameras have been used—chiefly miniature cameras for pictures from the air. The files include about 25,000 views, many of them unavailable for published reproduction and yet useful as part of the geographic record.

The time spent at individual study sites has varied according to opportunities and needs. The shortest has been within 1 day; the longest, 4 weeks. Mapping, photographing, and field observing have been done by the author; contacts with local people and interviews, especially in languages other than English, have been carried on by Mrs. Platt.

**AID RECEIVED.**—Full acknowledgments to persons and institutions for assistance in the project are beyond possible expression: to the University of Chicago for unremitting support, to the Rollin D. Salisbury Memorial Fund for a grant in aid of field research, to Illinois College for a retreat in which to write, to the National Research Council and the Social Science Research Committee for grants covering parts of the work, to persons both in the United States and in Latin America so numerous that they cannot be named here, although all are remembered with gratitude.

In the field the emphasis on rural units of land occupancy has been a matter of conviction in this particular project rather than of convenience. Lines of travel have not reached these rural spots without passing through all of the capital cities and most of the other large cities of Latin America. Urban people have contributed no less than rural people to the progress of the project, and data from cities enter largely into the background of the book, even though the specific materials gathered in urban geography are not presented here.

**SELECTIVE OMISSION.** Certain disadvantages arise from the decision to include in full detail only the results of rural study and at the same time to present these materials against a background of generalization based on wider study. Clearly, many of the generalizations are derived directly not from the accompanying rural data but from other accumulated data omitted from the text. No attempt has been made to include here all the materials of a long-drawn-out transition from local details to nationwide concepts.

The decision to skip over such intervening steps is made deliberately. The field studies are basic materials of original observation, offered unchanged as a means of projecting the reader directly into the areas under consideration. To simplify them and provide all the connections needed for elementary reading would not fall within the scope of the present work. The studies are separate glimpses and therefore are not to be read one after another as a continuous narrative.

At the same time, it is to be noted that the book is not a reference guide, in which factual information on any area is found by turning to a given page. On the contrary, the general parts of the book need to be read consecutively in order to indicate the line of thought and to provide a frame for the field studies. There is a continuous progression of ideas from beginning to end through the main sections, to introduce the subject (in Chap. I), to characterize the individual countries (in Chaps. II to X), and to interpret Latin America as it fits together and is related to the United States and the rest of the world (in Chaps. XI and XII).

**NOTE ON FINDINGS.** The project has attained its twenty-year objective, with added data on Latin America and with findings, both positive and negative, on geographic method. These findings suggest points to be noted as the book is opened.

First, specific data from field observation are seen as basic stuff in generalized knowledge. On the negative side, eyewitness facts are not to be mistaken for generalized knowledge: a single item, true though it be, represents regional reality only as a leaf represents the forest.

Second, maps are expressions of geographic truth incomparable in their way. Negatively, maps are but partial expressions and may distort the truth for those who misinterpret.

Finally, reconnaissance impressions provide a beginning of regional understanding—only a beginning, but nevertheless a well-grounded and empirical beginning, to be followed up and amplified in fuller understanding through precisely located and recorded observations still to come. Future observers should be able either to fit their findings into the framework here presented or to rebuild this into a better.

---

# Chapter I. Latin-American Intricacy

---

Latin America from Mexico to Patagonia is enough alike to be recognized as one of the big divisions of the world, with some general characteristics distinguishing it from Anglo-America, Europe, the Orient, and the rest.<sup>1</sup> This is sufficient reason for taking it as the subject of a book.

Beyond this initial statement, the slight degree of unity and similarity from end to end of Latin America may well be disregarded. There is little danger of forgetting that such general characteristics as the Romance official language and the republican form of government prevail in Latin America. There is greater danger of forgetting that these widely prevalent similarities are faint and easily exaggerated, whereas the differences from place to place are profound and call for penetrating analysis.

Differences from place to place are not only profound but also complex. Contrasts in human occupancy do not coincide simply and directly with contrasts in natural environment. Man's organization seems not to fit nature's framework.

**REGIONS, COUNTRIES, AND PEOPLE.** The pattern of countries outlined on a map (Fig. 2) bears little or no resemblance to that of major natural regions. The countries appear to form a mosaic of irregular areas differing in size from 7,000 to 3,000,000 square miles and in shape from cels to eggs. The major land forms are quite otherwise disposed (Fig. 3) in the well-known pattern of great western highlands in Mexico, Central America, and the Andes, lesser eastern highlands in the West Indies, Guiana, Brazil, and Patagonia, coastal lowlands of the Pacific and Atlantic margins, and interior lowlands of the Orinoco, the Amazon, and the Paraná.

No closer counterpart to the mosaic of countries is found in the map of climatic regions (Fig. 4), with its four tropical, four middle-latitude,

<sup>1</sup> "Latin America," is used here as a convenient name for all the Americas south of the United States, mainland and islands, countries and colonies. This conventional use implies no judgment as to whether or not the term "Latin" is appropriate in a literal sense; conspicuous non-Latin elements are included.



FIG. 2.—The countries are listed in the order of discussion. The colonies, listed separately on the map, are discussed among the countries. The mother countries to which the colonies belong are as follows: Britain, A, B, D, E, G, J, K, M, N; United States, C, F; France, H, I, P; Netherlands, L, O. The word "colonies" is used to refer to overseas territory in general and has no literal implication of a specific political status. (*Base of this and following maps of Latin America from "Hispanic America," Lambert Azimuthal Equal Area Projection, 1:6,000,000, American Geographical Society, New York, 1922.*)

and two highland climates. The maps of natural vegetation (Fig. 5) and soil (Fig. 6) resemble that of climates (Fig. 4). In fact, the vegetation map is practically another climatic map based on different criteria, and the soil map is no less climatic in distinguishing only great soil groups



FIG. 3.—The "Highlands" are blocks of land relatively high and rough, the "Lowlands" relatively low and smooth. Both altitude and ruggedness vary greatly from place to place, and the highlands include mountains, hills, plateaus, and even small plains. The "Western Highlands," or Cordilleras, include at least three structural divisions, identified by breaks on the map. Along the Pacific and Atlantic margins there are narrow coastal lowlands even in many places where none appear on the map. (*Boundaries from P. E. James, Distribution of Population in South America, Fig. 2, "Geographic Aspects of International Relations," University of Chicago Press, Chicago, 1938; "An Outline of Geography," Pl. 7, Ginn and Company, Boston, 1935.*)

characteristic of climatic types. The map of rock-structure regions (Fig. 7) corresponds naturally with the pattern of major land forms (Fig. 3) and not with that of countries (Fig. 2).

Apparent disconformity between countries and regions is not dispelled by including the basic human item of population in the map

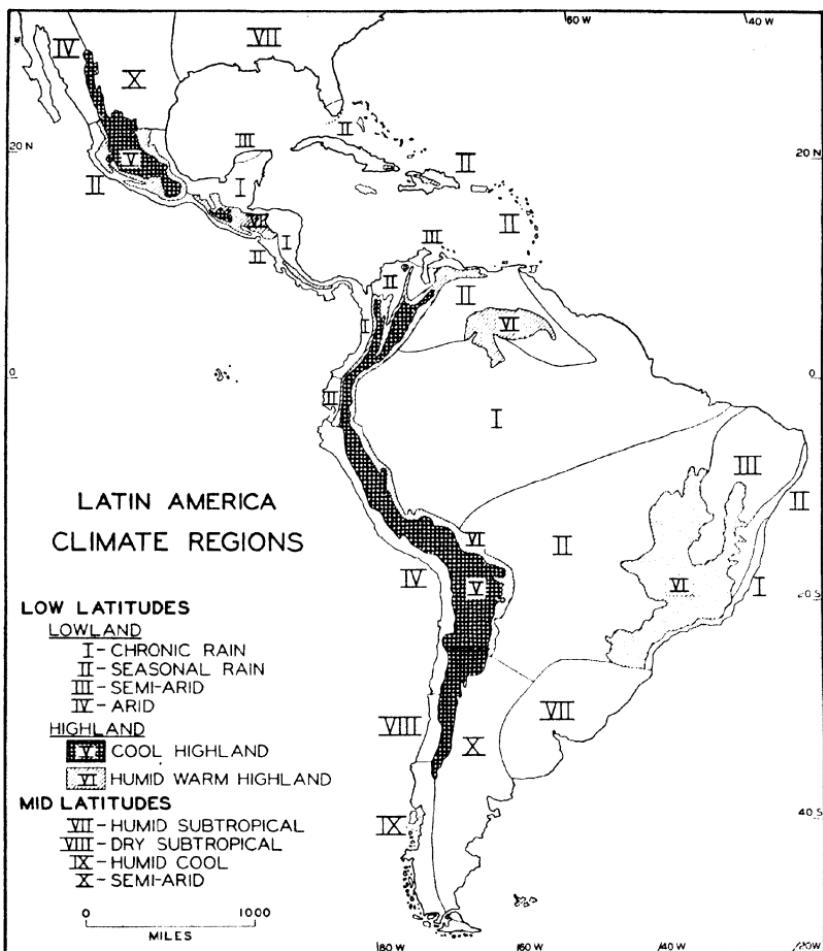


FIG. 4.—“Low Latitudes” are approximately within the tropics, and “Mid Latitudes” outside the tropics, north and south. “Cool Highlands” are the same as “High Highlands” in Fig. 491 (page 487) and in the text; “Humid Warm Highlands” the same as “Humid Low Highlands.” The lower boundary of cool highlands is the contour line of 2,000 meters (6,561 feet), approximating the lower limit of frost. The lower boundary of warm highlands is the contour line of 700 meters (2,296 feet), approximating the lower limit of mild warmth. The actual limits of frost and mild warmth differ with latitude, but the differences within the tropics are inconspicuous on the small-scale map. Dry low highlands are not distinguished from dry lowlands.

The sweeping lines drawn between lowland climates represent broad generalizations along boundaries where precise data are lacking to show detailed irregularity. The four low-latitude climates are similar in temperature, having summer heat in every season, but differ in rainfall. Areas of “chronic rain” have seasonal differences of rainfall but no season so dry that forests are deciduous and crops cease to grow. (*Highland contours generalized from sheets of the American Geographical Society, “Millionth Map of Hispanic America,” New York. Lowland divisions modified from W. D. Jones and D. S. Whittlesey, “Introduction to Economic Geography,” Fig. 1, University of Chicago Press, Chicago, 1925.)*

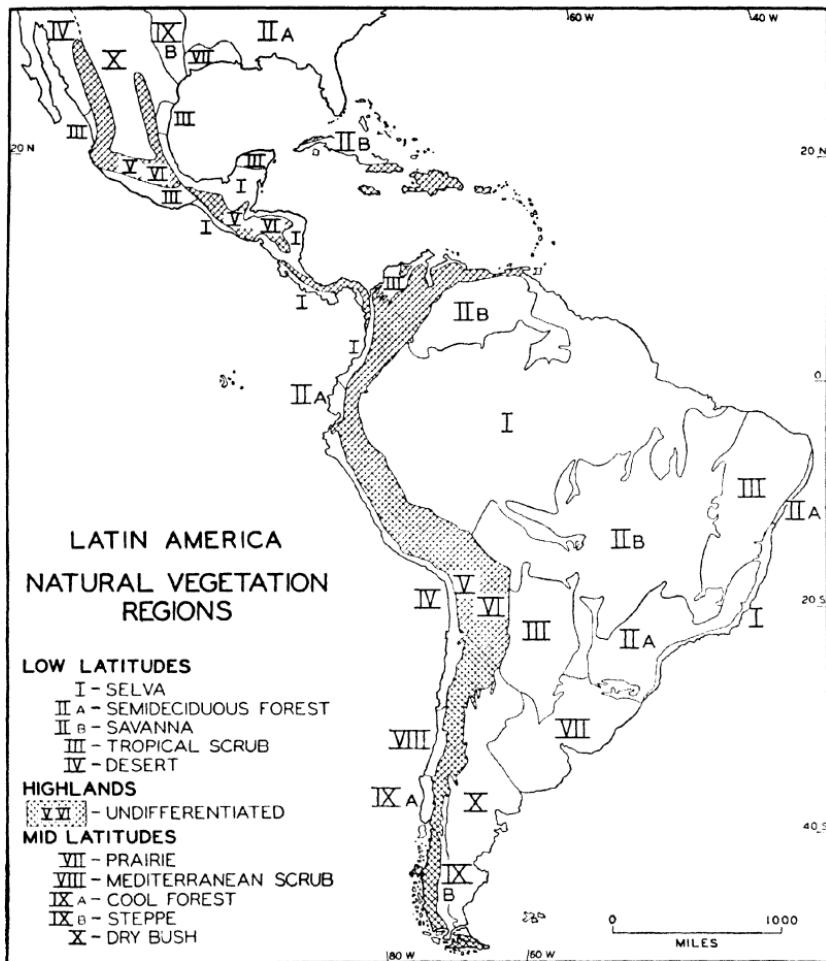


FIG. 5.—The numerals on the map correspond to those used for climates in Fig. 4. The two highland types of climate have different types of vegetation, but they are grouped together here. On the other hand, the seasonally rainy climate is subdivided to distinguish two types of vegetation, and so is the humid cool climate. (*Boundaries from P. E. James, Distribution of Population in South America, Fig. 3, "Geographic Aspects of International Relations," University of Chicago Press, Chicago, 1938; "An Outline of Geography," Pl. 1, Ginn and Company, Boston, 1935.*)

comparison (Fig. 8). People are intensely and irregularly concentrated in clusters that do not resemble the divisions on any of the maps of major natural regions (Figs. 3 to 7) in form or distribution. Additional complexity is suggested by the fact that there is no obvious similarity between the distribution of population and the mosaic of countries (Fig. 2).

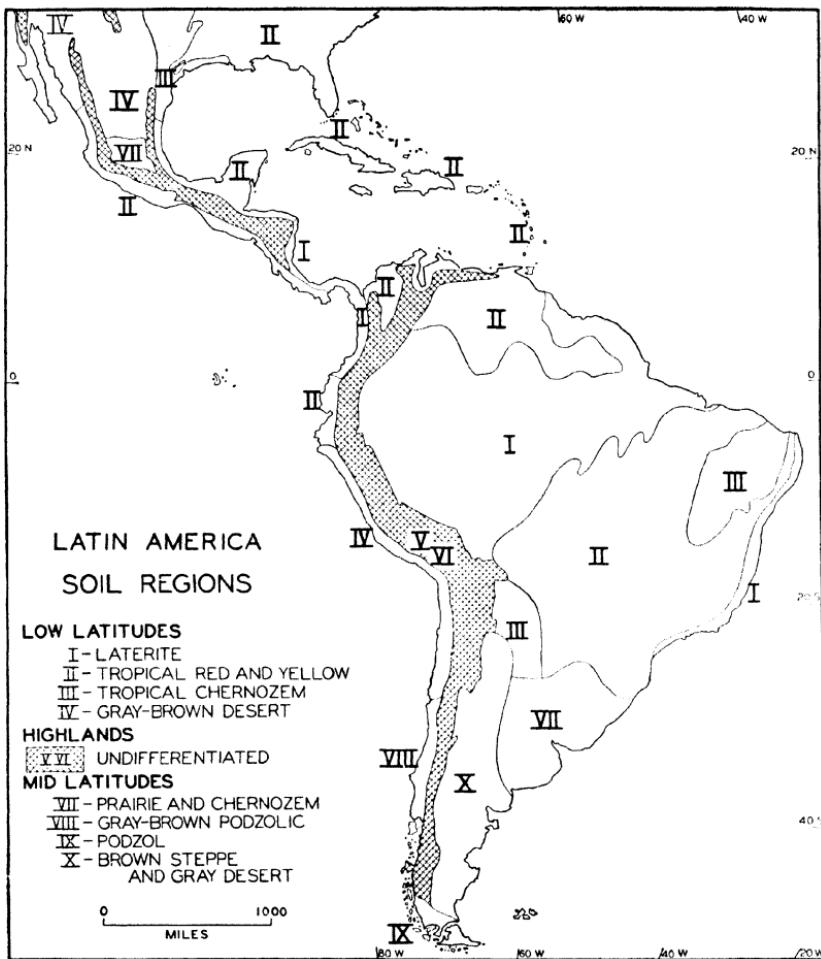


FIG. 6.—The numerals on the map correspond to those used for climates in Fig. 4, but to no subdivision in the highlands. The classification is of mature soils only and does not indicate important immature types, such as volcanic ash and alluvium. (*Boundaries from Vernon C. Finch and Glenn T. Trevartha, "Elements of Geography," Pl. 9.*)

Latin America would appear hopelessly confused were it not that these diverse elements fit together to form an intelligible complex pattern. Conformities do not exist, but orderly relationships do. To assume that there are no consistent relations between natural regions, boundaries of countries, and concentrations of people is as far from the truth as to assume that relations are simple and direct. The Latin-American patchwork of countries is not a crazy quilt without rhyme or reason but a tapestry of comprehensible design.

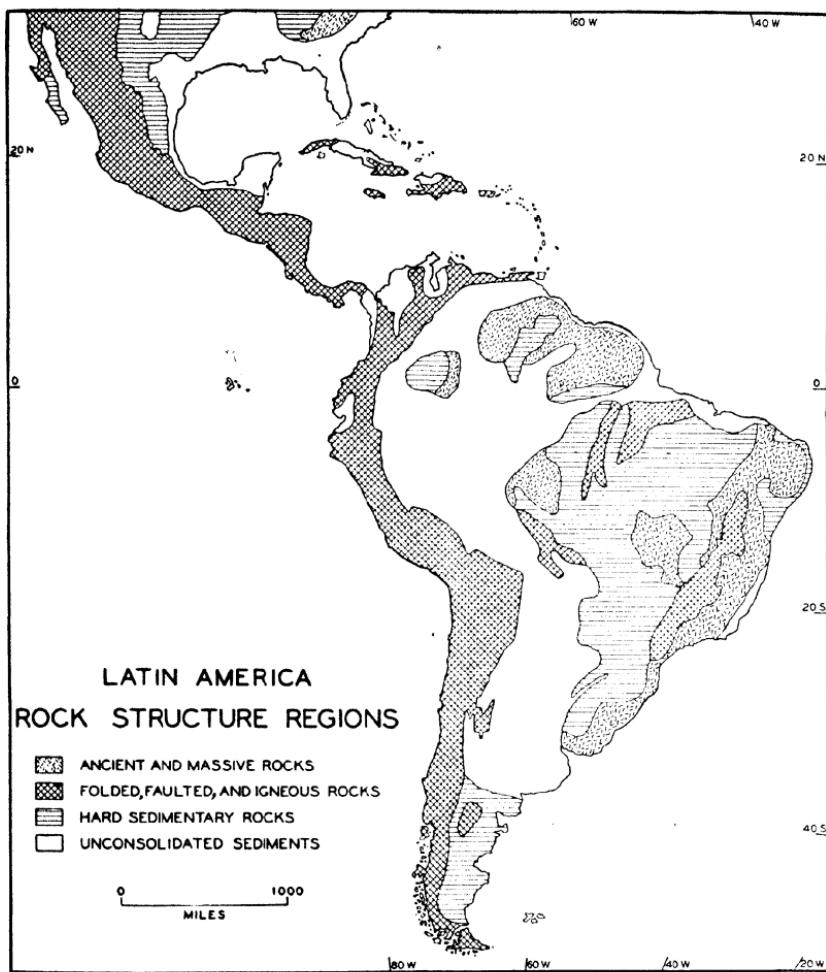


FIG. 7.—The areas correspond in general to those of land forms in Fig. 3. (*Boundaries from Vernor C. Finch and Glenn T. Trevartha, "Elements of Geography," Pl. 6.*)

The areal association of regions, countries, and people is intricate and elusive but nevertheless normal and understandable. Not only do all the countries fit together in a mosaic consistent with the background of nature and the grouping of population, but each country individually is a consistent unit, having its own personality to be understood and appreciated.

**CONCEPTS DEFINED.** As a preliminary to plainer understanding, some concepts taken thus far at face value from the map require modifica-

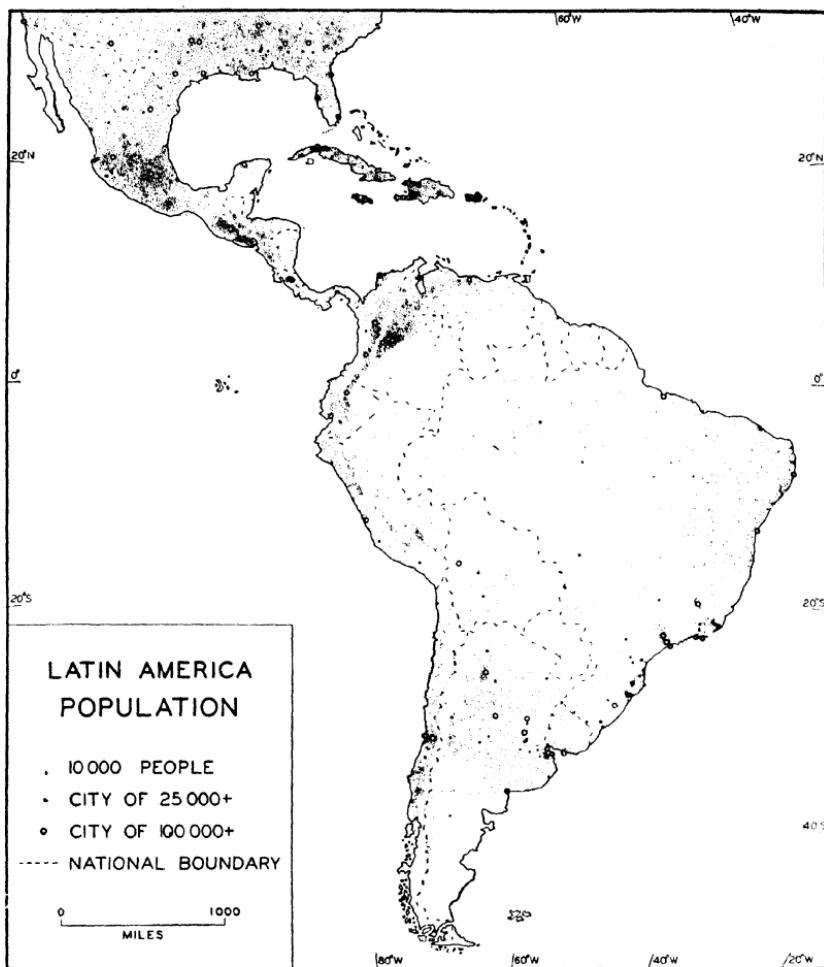


FIG. 8.—Distribution of population. (Drawn by Manuel C. Diaz. Data for 1930, from studies by Bouton Guyol, "Distribution of Population in South America," and John Abrahamson, "Distribution of Population in Caribbean America," University of Chicago M.S. theses, 1936.)

tion. In regard to major natural regions, such as "Western Highlands" (Fig. 3) or "Arid Climate" (Fig. 4), it is to be observed that these represent generalizations so broad as to be necessarily thin and coarse-grained. If characteristics that they imply are to cover large areas and allow for local variations, they are necessarily not intense and specific. They do not specify extremes of natural environment, which may be favorable or unfavorable for human occupancy. Such extremes, good or

bad, are those of local circumstances. Fertile plateaus and rugged peaks are in the same highland region; irrigated valleys and barren hills are in the same desert climate; and it is such details within regions that provide the setting for densely populated and unpopulated areas.

Maps of major natural regions reveal extensive aspects of natural environment. They suggest conditions mildly good or bad for settlement, and probabilities for local intensity. It is not strange that they fail to point specifically to conspicuous extremes in the distribution of people.

It should be mentioned that the term "regions" is taken in this book to refer to large areas uniform in certain respects and distinct from adjacent areas—both major regions on the continental maps and minor regions defined in more detail as logical subdivisions of major regions. The term is used for areas of more than a thousand square miles and not less and for areas of static homogeneity rather than of dynamic organization. Thus "region" here refers to an area that looks similar throughout in certain respects and different from adjacent areas and does not refer to an area united by a transportation system, as, for example, the diverse trade territory of a seaport joined together only by activity through its focus of traffic.

However, units of dynamic organization are not to be ignored in the complex pattern of Latin America. In fact, the countries themselves are conspicuous units of dynamic organization, and the recognition of their discordant but consistent relations to regions is important in interpreting the pattern.

The term "countries" is taken in this book to refer to sovereign states. The colonies of foreign powers are not specifically referred to under the term, but these colonies are to be considered in the total pattern of Latin America (Fig. 2) and to be included along with the countries in their appropriate places.

**FORMATION OF COUNTRIES.** In regard to countries as they appear on the map (Fig. 2), it is to be noted that these bare outlines of territory give only partial and faulty representation, not revealing more significant aspects of form and size. If countries are to be understood, they cannot be taken for granted, like the existence of matter in everyday life. The essence of countries is not square miles indiscriminately totaled and set off by boundaries, but people organized and occupying land. Because people make countries, it follows that the maps of population and countries, though not obviously similar, nevertheless are fundamentally related. Each Latin-American country has a concentration of population in an area relatively favorable for habitation, separated from similar concentrations in other countries by less densely populated and generally less hospitable territory. Many of these countries have not only a principal concentration in the most favorable area but also secondary concentra-

tions in near-by areas and tracts of unoccupied land intervening or outlying. Most of the boundaries between countries pass through relatively unoccupied territory separating principal centers. Most of the capital cities are in principal centers of concentrated population.

This pattern of countries reflects a long sequence of events, not predetermined by nature but subject to the vicissitudes of history proceeding in a natural setting. In the process, which began with the conquistadores or before, major centers of population have formed cores of political organization. Near-by centers have been joined together (as, for example, the various central states of Mexico). From major centers, political influence has extended over minor centers (as from central Mexico over Yucatán) and has reached into unoccupied territory to where it is met by counteractivity from other centers (as in the forested eastern lowlands where Mexico meets Guatemala). In respect to the political influence that makes countries, people are not all equal (for example, highland Indians are not equal to white landowners). But, generally, where there are large populations there are corresponding opportunities for political leadership.

**CHARACTERISTICS OF COUNTRIES.** The nature of the country-forming process has favored certain common characteristics. In most cases it is found that large areas unfavorable for settlement are divided politically between countries, even though uniform and undivided by nature (as, for example, the lowlands of Mexico and Central America); that large areas which have attracted settlement are undivided politically and form the central cores of large countries (such as the Central Plateau of Mexico); that small populous areas far from large centers form the central cores of small countries (such as the Central Plateau of Costa Rica); that small populous areas near large centers form provincial districts in large countries (such as Yucatán in Mexico).

Accordingly, the pattern of countries tends to disagree with that of natural regions, and boundaries between countries tend to cut across regions. Yet the two patterns have consistent relations; most of the countries contain whole populated areas and parts of adjacent sparsely populated areas. This suggests that it is normal for countries large or small to have internal variety and that the primary reason for such variety is to be found not in nationalistic desires for self-sufficiency but rather in the chance interspersion among good areas of inhospitable areas attached more or less by default to near-by centers.

These generalizations draw attention to apparent exceptions among the countries of Latin America (as, for example, El Salvador, containing only a populous area and no outlying sparsely populated districts). As a matter of fact, each country is unique and deserves to be considered with reference to its own characteristics in the light of general concepts.

**DISTRIBUTION OF PEOPLE.** Of regions and countries on the maps (Figs. 2 to 7) much has been said by way of introduction. The map of population (Fig. 8) needs no such explanation; its symbols are plain. Some of its implications are simple: it is known that people live where they can make a living, and rarely elsewhere, in Latin America (as, for example, in the fertile Central Plateau of Mexico rather than in the arid peninsula of Lower California).

But the distribution of population as a whole and in detail is not simple. Enough has been said of it in connection with regions and countries to suggest its fundamental importance. A closer view is needed than that of continental maps. For the various components of Latin America, thus far mentioned briefly on a continental scale, more detailed observation is in order on a larger scale. In fact, such observation in field studies forms the bulk of the chapters that follow. In these chapters (II to X) it is convenient to consider the countries one by one, beginning at the north.

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## Chapter II. Mexico

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Mexico, the North American member of Latin America, exemplifies certain of the general characteristics of Latin-American countries indicated in the previous chapter. It has a densely populated region attractive for habitation as the central core of the country, smaller populous areas as provincial districts, and tracts of nearly unoccupied territory as outlying borderlands (Fig. 9). The outline of the country fails to conform to that of natural regions, and its territory contains parts of several regions, a striking variety in natural environment being the result. Its boundaries with other countries cut across sparsely populated regions. Thus the fact that Mexico adjoins the United States and is separated from it only by a boundary line is qualified by the fact that this boundary crosses semiarid outlying areas and that the central region of Mexico is a thousand miles to the south, far separated from populous parts of the United States. The unity of the country is that not of uniformity but of dynamic organization by cohesion of a cluster of regional areas around a strong central nucleus.

**CENTRAL PLATEAU.** The core of Mexico is the Central Plateau (Fig. 9). This region contains more than half the Mexican people (Fig. 8, page 16), although its area is only one-seventh the area of the country. It has both a majority of the urban population and a majority of the rural population. The largest city is the unrivaled focus of national interests, not only political but also financial, commercial, industrial, and social, and is the hub of a transportation scheme tying the country together, after a fashion, by rail, water, road, and air (Fig. 10).<sup>1</sup>

The Central Plateau is within the major region of western highlands indicated on continental maps (Fig. 3, page 11). It is a small but important constituent region marked by the coincidence of relatively favorable natural conditions. By no mere accident is the region of recent volcanic activity also the region of greatest human activity in Mexico.

<sup>1</sup> For a fuller discussion of transportation (land, water, and air), both in Mexico and in the other countries, see R. S. Platt, *Inland Transport in Latin America*, Proceedings of the Eighth American Scientific Congress (Washington, D.C., 1940).

Vulcanism has given rise to highlands of a distinctive sort, as follows: (1) Large parts of the Central Plateau are smooth, owing to widespread deposition of volcanic and lacustrine materials between and around volcanic cones, still undissected by erosion. (2) Much of the smooth area is fertile, owing to a mantle of volcanic ash and alluvial wash, well



FIG. 9.—The "Core Region" contains the national capital. The Central Plateau of Mexico contains not only the capital but also a large portion of the Mexican population and is clearly the heart of the country, the national center of gravity. The outline of the core region is drawn to indicate the main area of dense population. "Outlying Regions" are named but not bounded. In fact, they even overlap national boundaries in normal cases, although named ("northern" and "southern") from the viewpoint of Mexico.

The 700-meter (2,296-foot) contour line outlines the highland area, marking the lower margin of low highlands—including both humid warm highlands in low latitudes, as in the climate map (Fig. 4), and also dry low highlands and middle-latitude low highlands, not distinguished from lowlands in the climate map. The field sites are numbered in the order of discussion.

drained and still unleached by ground water. (3) Most of the smooth fertile area is at an altitude high enough to escape the constant heat of tropical lowlands and low enough to escape the constant cold of mountain snow fields. The altitude, attitude, and latitude of the area are such as to provide moderate seasonal rainfall.

The volcanic plateau region, thus distinctively endowed, supported a relatively compact and highly organized sedentary agricultural population in pre-Columbian times and continues at the present time to support such a population in a similar way.

As a matter of fact, the region appears to lack a substantial basis for supporting the bulk of its population in any convenient way other than by sedentary subsistence agriculture. Most of it is high enough to enjoy occasional frosty weather, and its farm products are those of middle latitudes, not those tropical specialties which gain easy access to world markets.



FIG. 10.—Railways and waterways together form a coherent national system, connecting all the outlying states with the capital. Air lines (Fig. 509, page 531) supplement the long routes to far corners of the country, and motor roads (not shown on the map) are being extended to supplement short routes in the center of the country and overland connections with the United States. The principal external connections are eastward by water and northward by land. Connections with the railways of the United States are indicated by lines crossing the Border, though the railway net of the United States is omitted from the map. External connections by land and water appear on a continental map (Fig. 502, page 530). There have been no appreciable changes since the map was made (1940). (*Compilation of transport data and drawing of this and the other transportation maps by Manuel C. Diaz.*)

Yet another resource is not to be forgotten, namely, precious metals, found concentrated in a few spots associated with ancient, not recent, vulcanism. Because of this resource, Spain formed an interest in the region, and "New Spain" assumed a structure now inherited by modern Mexico with the Central Plateau as its core. Mexican mines continue to produce, leading the world in silver and contributing important amounts

**REGIONAL DIFFERENCES.** Outlying regions surround the Central Plateau. Most of these are other minor members of the same major highland region, but this fact does not make them much like the Central Plateau. Rugged slopes predominate over smooth land in the ranges bordering the plateau and in the southern highlands (Fig. 9).

The highland climates are more highly differentiated in fact than is indicated on a continental map (Fig. 4, page 12). Plateau areas of the northern highlands are semiarid and are distinguished from the Central Plateau primarily by rainfall insufficient for agriculture without irrigation and rainfall on near-by ranges insufficient to provide for much irrigation.

Other parts of the highlands are distinguished by differences in temperature associated with altitude. These differences are so intricately distributed as to be hard to map, but they may be simply classified for description, and at least one cardinal distinction is indicated on the map (Fig. 4, page 12)—the distinction between cool highlands and humid warm highlands, or high highlands and low highlands. In contrast with most of the Central Plateau, in the cool highlands, where there are moderate warmth and seasonal frost, the warm highlands, generally less than 2,000 meters (6,561 feet),<sup>1</sup> have freedom from frost in every season permitting all-year-round plant growth. Below this zone of warm highlands, from 700 meters (2,296 feet) down to sea level, are the tropical lowland climates marked by prevalence of heat. At the opposite extreme, within the cool highlands, are very high areas, small and undifferentiated on the map, where occurrence of frost in every season precludes agriculture. In general, these are more than 3,500 meters (11,483 feet) in altitude.

This simple altitudinal classification approximates local terminology, recognizing some of the same climatic distinctions—*tierra caliente* for hot lowlands (below 700 meters), *tierra templada* for warm highlands without frost (700 to 2,000 meters), and *tierra fría* for cool highlands with frost (over 2,000 meters). The further distinction within the *tierra fría* between moderately high highlands with seasonal frost (2,000 to 3,500 meters) and very high highlands with chronic frost (over 3,500 meters) as an additional regional type is recognized less regularly and designated only partly by such terms as *tierra helada*, *páramo*, and *puna*,<sup>2</sup> used elsewhere in Latin America if not in Mexico.

<sup>1</sup> The figures used for climatic boundaries are merely approximations selected for convenience. The round numbers in meters are less misleading than their equivalents in feet, which give an unwarranted impression of numerical precision. Obviously, climatic types are not actually bounded by contour lines, from Mexico to Ecuador. At the same time the general distribution of highland climates on the small scale of the continental map is reasonably correct—at least, as nearly correct as the distribution of lowland types of climate in the great areas where weather observation is lacking.

<sup>2</sup> The terms are not synonymous, though all refer to areas too high for crop agriculture—

Mexico has relatively little good land among the slopes of the *tierra templada* and relatively little in the *tierra caliente*, considering the narrowness of coastal lowlands, infertility in many parts, aridity in the northwest, and excessive rainfall in parts of the south. Good land in the very high highlands is hardly to be considered. The main body of good land in Mexico is in the high highlands of the *tierra fría*, at the moderately high altitude of the Central Plateau.

**OUTLYING REGIONS.** It is clear that the outlying regions are diverse in character but have one characteristic in common: they are all inferior to the Central Plateau as areas for easy development and support of a great population.

All these regions contain scattered resources and certain spots of unusual productivity. In the desert north are fine oases; in the northern mountains are mines of precious and industrial metals; in the eastern coastal lowlands are petroleum fields; in the southern highlands are small prototypes of Central Plateau farms; in the tropical lowlands are forest resources and specialized tropical plantations.

Indeed these rich spots in other regions furnish a large part of Mexico's export production. For a decade the petroleum fields exceeded the Central Plateau in producing sudden wealth.

Yet the outlying regions with their limited, scattered, and special resources and scanty population are still outlying. The Central Plateau, with its habitable and inhabited lands and its established centrality, is the heart of Mexico. Thanks to this region, Mexico has the largest population of any of the 18 Spanish-American countries.

**MODERN MEXICO.** Some outstanding characteristics of modern Mexico stem from the fact that the bulk of the Mexican people, living in the Central Plateau, have a primary interest in subsistence production, whereas foreigners of the commercial world have had a primary interest in production for commerce, from resources scattered in other parts of the country. This divergence of interests has been emphasized by the proximity of Mexico to the United States: the largest Spanish-American country of highland Indian development next door to the largest North Atlantic country of modern industrial development. Crosscurrents of interest naturally have arisen— a desire for equivalent prosperity on the one hand and a desire for acquisition of resources on the other. Attraction and repulsion have resulted: admiration for the United States as a land of opportunity and resentment against American influence; a desire for material welfare, leading Mexico to combat the old order which had produced such welfare in the United States; a welcome to capital and *tierra helada* to frozen heights in Mexico, *páramo* to Alpine pastures in the northern Andes, and *puna* to bleaker pastures in the central Andes.

confiscation of it. Thus attraction to the United States is accompanied by revolution against the established system of the United States.

Among Latin-American countries, Mexico is an outstanding case of stimulation by irritation. The policy of Mexico for the Mexicans is vigorous and pervasive. The Central Plateau as the heart of Mexico has reasserted its leadership over the country, including outlying parts of the country where foreign exploitation flourished most.

The revolution that has taken place in Mexico since 1911 is a success in having overcome opposition and won a free hand in social reform and indigenous cultural advance. But economic success has not yet been attained; no revolutionary change has transformed the Central Plateau from a place of subsistence living to a source of new and greater productivity. A dilemma persists in the Mexican desire for a new order without losing the benefits of the old. Also, there is a dilemma for the United States between the "good neighbor" policy and property rights of the old order. Under the pressure of a new revolution from overseas, both dilemmas tend to disappear.

### Field Studies

Such broad generalizations regarding the national and international affairs of Mexico do not spring directly from studying small rural units of land occupancy, like those described in the following microgeographic field studies. The following studies tell only part of the story, the rest of which cannot be told fully either in this series of observations or in any single simple series.

But these studies provide a basic part of the story. Valid generalizations depend ultimately on factual details, and here are some of the details. What is there in the Central Plateau to make the region and the nation what they are? What is there in the outlying regions to give them their character? Reconnaissance offers preliminary answers, recorded on the fundamental scale of direct human observation, from which broader generalizations on a regional scale all take their start.

*In the Central Plateau.* Of the following field studies the first three are of places in the Central Plateau, the core region of Mexico. The Central Plateau is not a homogeneous area of uniform surface but a complex array of mountain ranges and intermont basins. The good land is distributed in separate tracts and interspersed with poor land. But it is no less habitable on this account. In fact, such distribution is consistent with the development and maintenance of coherent local organization in small communities, each having its separate identity and varied land resources.

There are thousands of small communities in the Central Plateau. One of these is Magdalena Atlipac (1). The name of the pueblo, half Spanish and half Indian, indicates its inheritance of Indian agriculture and living conditions, modified in Spanish ways. The deep and tenacious roots of Mexico are represented in this small unit of occupancy.

There are also thousands of landed estates in the Central Plateau, of Spanish Colonial origin. One of them is Hacienda Jajalpa (2). Superficially it is quite different from the pueblo, but fundamentally it has

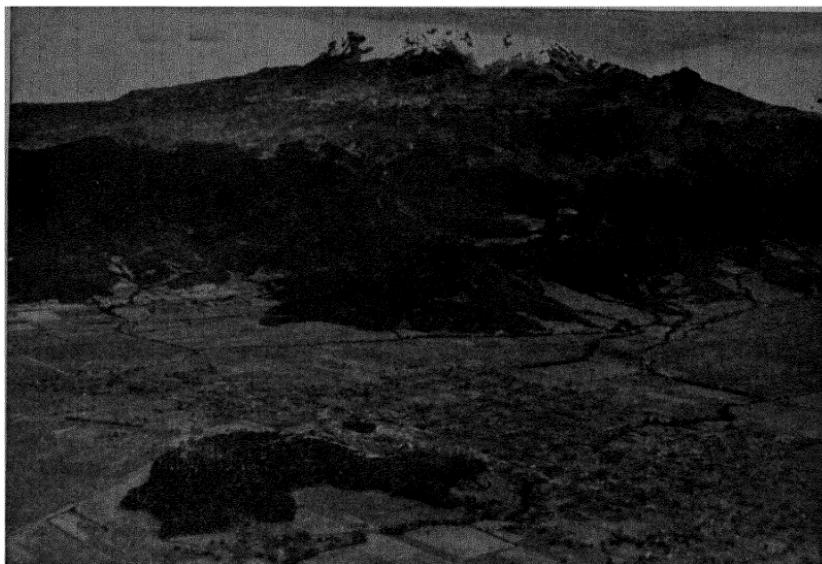


FIG. 11.—The southeast corner of the Valley of Mexico. Farm fields and town (Amecameca) on the basin floor, 7,600 feet above the sea; forested slopes and isolated hill; grassy upper slopes between 13,000 and 15,000 feet; and the snowy crest of Ixtacihuatl, 17,342 feet. Air view looking northeast, February, 1936.

much in common and is no less characteristic of land occupancy in the heart of Mexico.

In a few small areas of the Central Plateau there are mining districts based on localized mineral resources. San Rafael is one of a score of mines in the one great silver district of the region (3). Mining concerns directly only a small proportion of the people in the Central Plateau, but it has attracted foreign interests from Spanish Colonial times until now and therefore is prominent in the development of the country and rightly is included as characteristic of Mexican occupancy. Mines are not especially characteristic of the Central Plateau but are distributed in many more districts in other parts of Mexico, particularly in the northern highlands.

The three field studies in the Central Plateau all are at altitudes within the high highlands, where winter frost is known. In addition, there are spots of very high altitude, where there is chronic frost. But these are insignificant both in area and in direct relations to the life of the region, even though a few snow-capped peaks are conspicuous in the landscape (Fig. 11). There are also areas of low highland where frost is unknown, particularly on the southern and western margins of the Central Plateau. In some lower basins of the margin there are differences of development in keeping with a year-round growing season—the planting of sugar

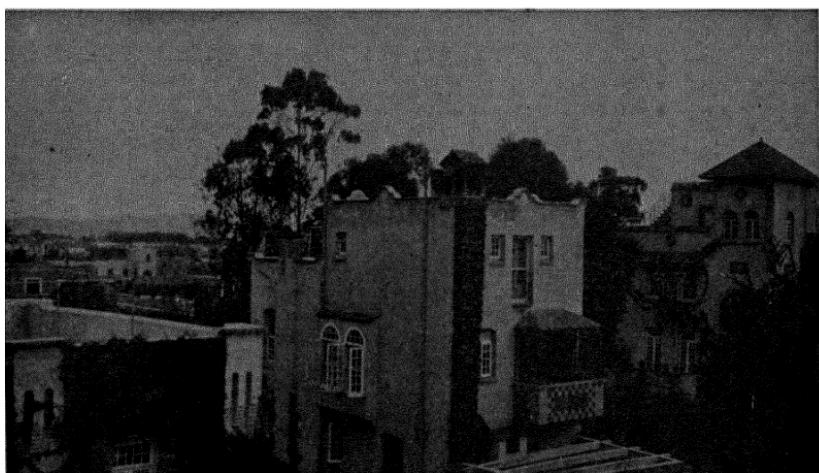


FIG. 12.—Mexico City; a modern residential district. Altitude 7,400 feet. View looking northeast toward Guadalupe, August, 1928.

A picture of each Latin-American capital is included, to keep the urban center in view among the assembled rural studies. These pictures are purposely diversified and are not intended for comparing city with city.

cane, for example. But major characteristics of the Central Plateau persist even there: subsistence farming, pueblos, and haciendas of Indian and Spanish heritage.

Of course there are cities in the Central Plateau, not covered here in field studies but not disregarded in the broad generalizations, and fulfilling a vital function in regional and national organization. They include market centers in agricultural districts, mining centers, industrial centers, state capitals, and Mexico City, the national focus of all major interests (Fig. 12).

*In Outlying Regions.* The next three field studies are in northern Mexico. The north is marked by drought almost everywhere and by winters too frosty to be considered tropical. Population is sparse and not

long-rooted in the soil as is that of the Central Plateau. Extensive cattle ranches of low productivity utilize the scanty resources of semiarid grazing land. The more intensive activities of mining and irrigation utilize special resources in small spots, few and far between.

Major irrigation districts of the northern highlands are located where rivers from the higher mountains flow out into broad valleys or basins. The largest of such districts is the Laguna, and the largest hacienda in the district is Tlahualilo (4). Although this great establishment is unusual in size, it is nevertheless similar to its neighbors in farm practices and is a good example of large-scale irrigation and commercial production.

El Verde Farm in the Pacific coastal lowlands is an example of irrigation on a very small scale, combined with some farming without irrigation (5). In the Pacific coastal lowlands, as well as in the northern highlands, there are large irrigated haciendas watered by rivers that flow from the high mountains along the western border of the highland region. But small farms in small communities are no less characteristic than large plantations, and far more numerous. Also, dry farming without irrigation is even more widespread.

The peninsula of Baja California (Lower California) likewise is dry, and its narrow backbone of low mountains contains no large rainy watershed as a source for large streams. Therefore sparse occupancy and small-scale farming are characteristic. Mejia Farm is an example, with its semiarid grazing land, its irrigation from a small stream, and its dry farming without irrigation (6). Being near the northern border of Mexico, it shows traces of affinity with California, in winter instead of summer rainfall and in the stimulating effect of a border market.

In the territorial division of Baja California there is one great district of irrigation, at the head of the Gulf of California, depending not on the water of the peninsula but on that of the Colorado River, shared by Mexico and the United States. This is Mexico's part of Imperial Valley, in the delta of the Colorado. Farther east along the international border the waters of another highland river, the Rio Grande, are subject to apportionment between Mexico and the United States.

As already implied, there are mining districts in northern Mexico, like those of the Central Plateau and more prominent, in view of the few developments of other sorts. So there are cities in the north, most of them centers of mining districts with the accompanying commercial and industrial interests.

From the far northwest in Baja California the last Mexican study jumps to the far southeast in Yucatán, also a peninsula, literally and practically almost an island off the coast of Mexico, reached by water from the central core of the country. As in the Central Plateau, farming here has a background of sedentary Indian subsistence, but unlike the

Central Plateau a basis for highly specialized commercial agriculture has been available, under conditions of year-round plant growth and seasonal rainfall. In organization for export production large haciendas are characteristic. One of these is Hacienda Chichí (7).

Under recent conditions of revolutionary expropriation of land in Mexico and world-wide depression, the economic system of Yucatán is in the process of change. The breaking up of haciendas has a more profound effect in this district of large-scale export production than in the

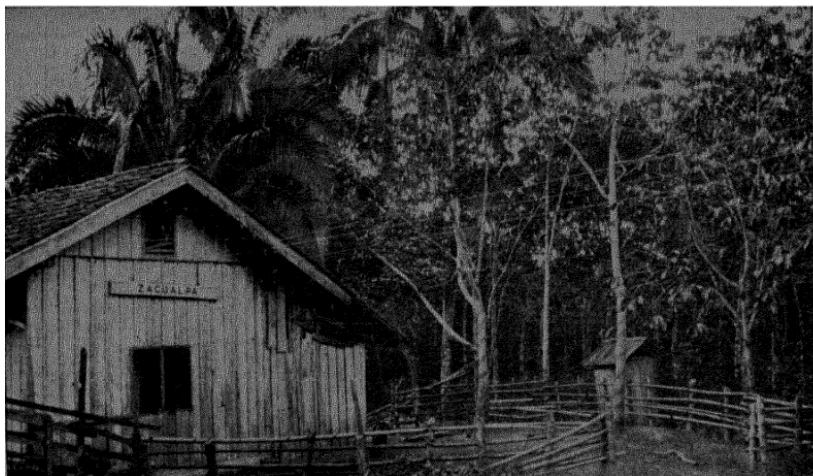


FIG. 18.—A plantation of Mexican rubber trees (*Castilla*), in an area of rainy low-latitude climate, Pacific coastal lowlands, state of Chiapas. Established about 1910, abandoned after decline of rubber prices and evidence of low productivity. Spiral marks of experimental tapping visible on trees. Station and corral for cattle loading, Pan American Railway route, near Guatemalan border, March, 1922.

Central Plateau, where subsistence economy prevails. Hacienda Chichí here represents normal arrangements under the old system. What may succeed these arrangements, after the system changes, is not yet clear.

The Mexican studies included in this series do not represent all the outlying regions of the country. There are none in the rainy tropical lowlands (Fig. 13) and low highlands and none in the petroleum fields of the Gulf Coastal Lowlands. But these have been included in traverse observation and have not been disregarded in Mexican generalizations. Moreover, they are represented in some ways by field studies in other countries: Mexican petroleum fields by those of Maracaibo, Venezuela, developed by the same foreign interests with similar organization and technology; and Mexican rainy lowlands and low highlands by those of Guatemala close by, where rainy lowlands and low highlands are of

greater relative importance in national economy than they are in Mexico under the dominance of the Central Plateau.

### 1. MAGDALENA ATLIPAC<sup>1</sup>

#### A PUEBLO IN THE CENTRAL PLATEAU

The Central Plateau is considered to be the heart of Mexico. In the Central

the pueblo of Magdalena Atlipac is one of many rural communities [Fig. 9(1)].<sup>2</sup>

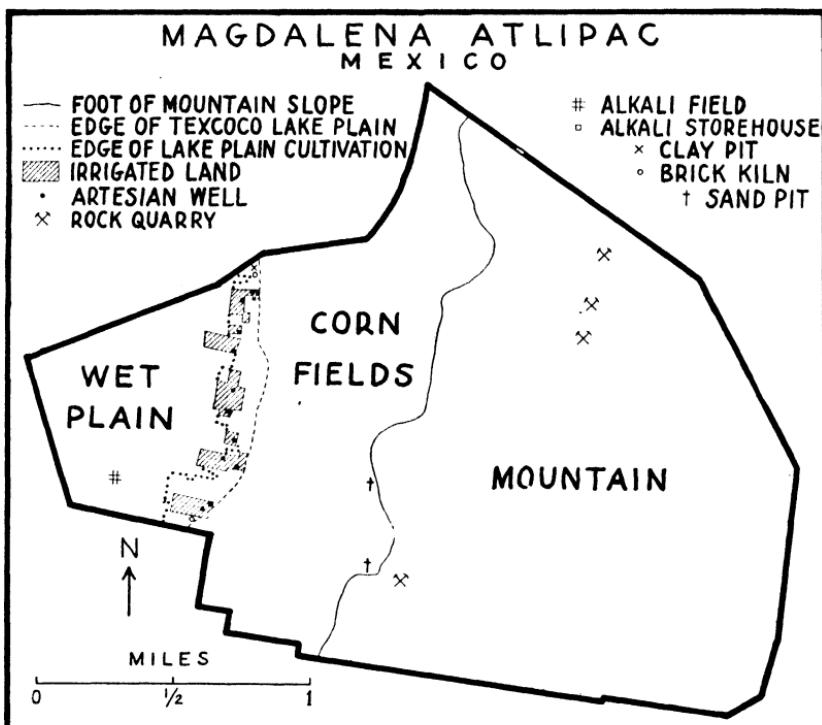


FIG. 14.—Land types and resources of the pueblo.

Plateau the Valley of Mexico is a conspicuous unit. In the Valley of Mexico

**TYPES OF PUEBLO LAND.** The land of the pueblo has an area of about

<sup>1</sup> Fieldwork in August, 1928, by University of Chicago party led by R. S. Platt and including Le Roy R. Hansen, Charles Ray Murphy, Ben S. Patterson, W. Le Roy Perkins, George H. Primmer, Eunice R. Blackburn, Harriet Carter, Florence R. Eddy, Alice Foster, Bessie P. Knight, Lois Olson, Harriet S. Platt, Marguerite Uttley, Nina L. Wheeler, R. S. Platt, Magdalena Atlipac—A Study in Terrene Occupancy in Mexico, "Geographic Surveys," *Geographic Society of Chicago, Bulletin* 9 (1933), pp. 45-75.

<sup>2</sup> The numbers by which field studies are designated correspond with those on the regional maps in each chapter. Thus Magdalena Atlipac is number 1 in the text and on the map of Mexico, and "Fig. 9(1)" refers to site number 1 in Fig. 9. In some cases separate items covered by a single field number on the map are designated by the addition of letters to numbers in the text [e.g. Brazil 4(a)].

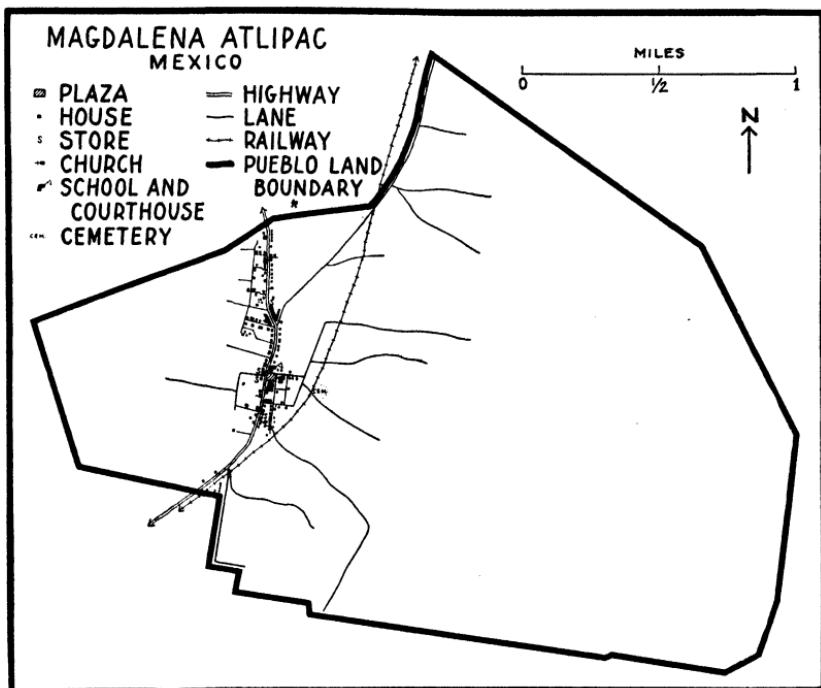


FIG. 15.—Buildings and roads of the pueblo.



FIG. 16.—Magdalena Atlipac from one of the mountain quarries; view looking west. At the edge of the quarry in the foreground are yucca plants in the center and a palm tree at the right. In the middle distance at the foot of the mountain are the cornfields of the community, appearing gray in the picture. Beyond is the wet lake plain, appearing very light in shade. The village is among the trees between the cornfields and the wet plain. On the farther side of the lake plain, isolated peaks near Mexico City are barely visible.

four square miles (Fig. 14). The main types of land are (1) steeply sloping mountainside, (2) gently sloping cultivated plain, (3) the village along a highway at the lower edge of the cultivated slope (Fig. 15), (4) flat reclaimed land adjoining the village, (5) flat marshy land.

*Mountain Slope.* The major characteristics of the types of land may be summarized as follows: The mountain-

motley herds of donkeys, cows, goats, and sheep, which wander daily up and down the slope during the wet season, under the care of village boys, and return nightly to the courtyards of their owners in the village. The donkeys are the mainstay of field work and burden bearing. The other animals furnish a small supply of meat, the cows and goats give a little milk, and the sheep a little wool.

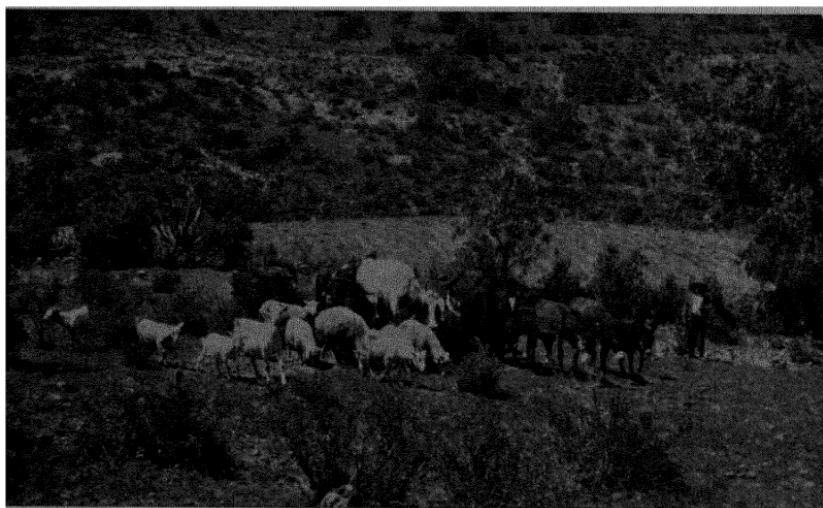


FIG. 17.—A herd on the mountain slope, Magdalena Atlipac; view looking southeast. A small cultivated field just beyond the herd in a reentrant at the foot of the mountain. Pepper trees, bushes, and grass on the slope above.

side occupies 1,500 acres, 60 per cent of the area, sloping westward from a peak about 9,000 feet above sea level, 1,600 feet above the village. It is of volcanic rock and ash. On it are four small quarries from which scoriaceous basalt is produced for road material or chiseled into blocks for building foundations and doorframes in the village (Fig. 16) and two quarries from which volcanic tuff is produced for house trimming.

The thin stony soil of the mountain supports a sparse vegetation of grass and brushwood, meager pasturage for the livestock of the village (Fig. 17),

The mountain also provides brushwood, gathered by some of the poorer villagers to be dried and made into brooms which are sold for street sweeping in Mexico City. Other wood brought down from the mountain is from pepper trees cut for fuel (Fig. 17). Since the trees grow rapidly and firewood is little needed except for cooking, the supply is ample. High up on the mountain there are a few pines and cedars, but not enough to furnish lumber and charcoal for the village.

Agriculture is not characteristic of the mountain. In some spots the slope is not too steep nor the soil too thin

for cultivation; but even these spots are inferior, and only a few small patches are cultivated at present.

The one crop that really grows well in such dry stony land is maguey (Fig. 18). But this crop is unsuitable for small-scale production in limited patches of land. It requires about seven years to grow to maturity and then yields its product of juice during a period of only a few weeks, so that for regular production on a commercial scale it requires a large tract of land,

receive scant attention from their owners, who merely use the dried leaves for fuel and occasionally make a little fiber from the heart.

There is, however, one man in the village who specializes in pulque making, raising some maguey himself and finding enough other plants in the community for a small regular production, less than enough to meet the village demand. Under existing conditions of land scarcity and divided control, little increase in maguey is

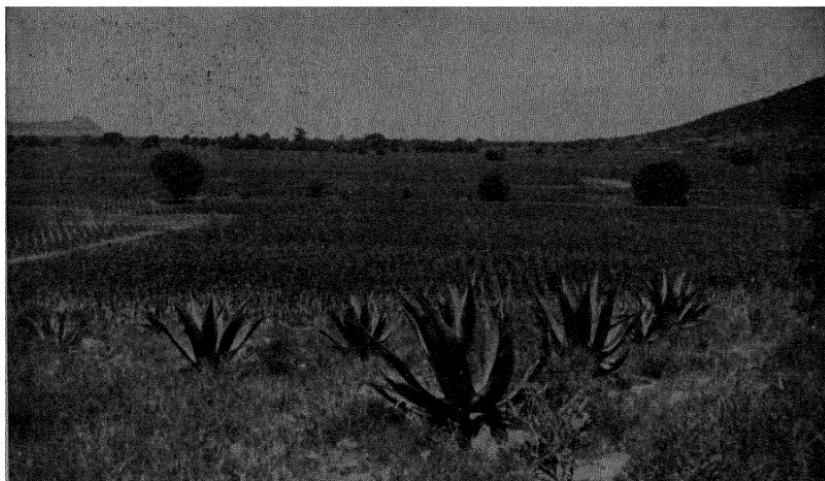


FIG. 18.—Maguey plants on the mountain slope, cornfields below, Magdalena Atlipac. Lower slope of a neighboring volcanic cone at the right; lacustrine plain in the background at the left. View looking west from the northern border of the pueblo land.

only a small fraction of which is productive at any one season. At the same time, it is hardly worthwhile to grow maguey on less than a commercial scale. The collection of the juice and the making of the beverage pulque by fermentation require a specialist with special equipment; and for household supply it is not practicable to have such a specialist engaged, even temporarily, because the perishability of the beverage makes it impossible to store up a supply for more than two days. Therefore, most of the patches and fringes of maguey in the community

likely either on the mountain or elsewhere in the community.

*Cultivated Slope.* Other crops are characteristic of the community, and the chief area of their production is at the foot of the mountain in the second type of land (Figs. 14, 18, and 19). This gently sloping strip of plain has an area of about 630 acres, 25 per cent of the community. Its soil is fertile sandy loam, and its smooth surface is interrupted only by a few parallel watercourses crossing from the mountain to the lake. It is like one great cornfield—yet not one, but a mosaic

of innumerable little fields, distinguished by the varied alignment of their rows.

More than half the fields, apparently not different in land character, have rows of beans planted between rows of corn—in most cases, two kinds of beans in rows side by side,—habas and

the Corn Belt of the United States. The winter is dry, and frost is of common occurrence from October to March. Fields are plowed in winter and re-worked after rains, if any occur, in accordance with dry-farming practice. In April or May, before the start of the rainy season, corn is planted, in

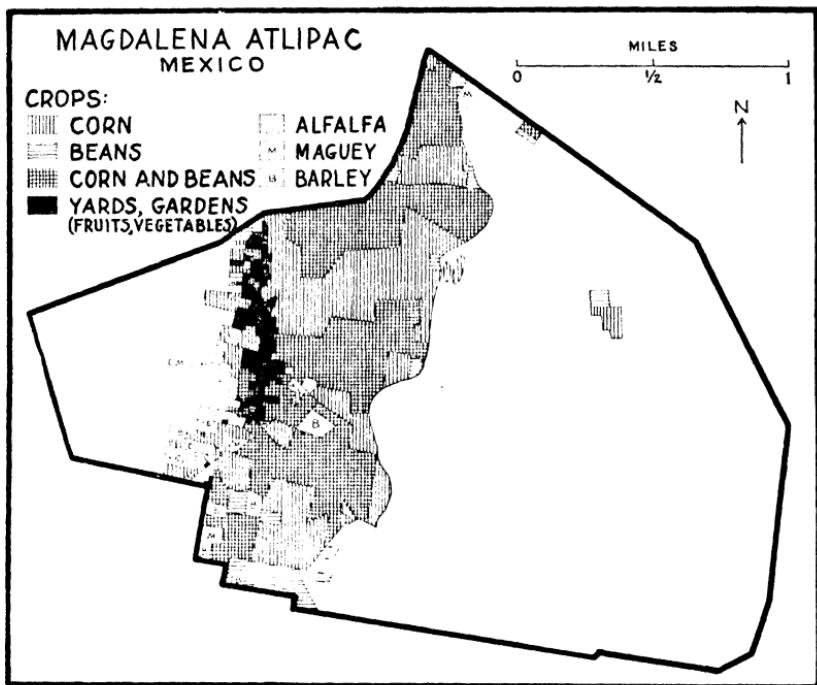


FIG. 19.—Crops and village land of the pueblo. In addition to other crops shown, fields of chili pepper are marked with the letter C.

frijoles. In a few fields, beans are grown without corn, particularly on the slightly drier and stonier land near the foot of the mountain, frijoles growing somewhat better than corn in a short period with limited moisture. In a few other fields, barley is raised as an alternative cereal crop.

In general, crops occupy the ground through about the same period as in

furrows. In May or June, after the corn is started, habas are planted; and in June or July, after the habas are up, frijoles are planted. Meanwhile the rains begin, in afternoon showers, almost daily, a total of more than twenty inches from June to September in good years, less in bad years.<sup>1</sup> There is fertilizing with manure, and plow cultivation (Fig. 20), finally changing

<sup>1</sup> Data for Tacubaya, D.F., 17 miles west of Magdalena Atlipac, 1921-1925: 23 inches of rainfall, 76 per cent of the mean annual total, during the 4 months from June to September; mean temperature of the coolest month, January, 55°F.; and of the warmest month,

the furrows into ridges, to cover the roots and hold moisture. Thereafter, weeding is done by hand.

The three crops mature at about the same time and are harvested in November. They are carried, stalks and all, to the owner's house in the village, where corn and beans are stored for the year's food supply of the family

and the adobe is dug and dried at the site of the house. Each dwelling is designed to house a family in its rooms and livestock in its enclosure and is set in the midst of fruit trees and vegetable garden (Fig. 21). Here are produced in the soil of the village itself crops of considerable importance for almost every household, to supplement



FIG. 20.—Plow cultivation of a field of corn, habas, and frijoles, Magdalena Atlipac. A small neighboring volcanic cone in the background. View looking northwest.

or for sale in case of a surplus and stalks and stems are stored for winter forage.

*Village.* The village itself marks the third type of land (Figs. 15 and 19), situated at the lower margin of the gently sloping cultivated area, along the highway which skirts the lake plain. It occupies 3 per cent of the land area, 75 acres, and contains about 200 houses, built of adobe brick and trimmed with stone or with baked brick. The stone is from the mountain, the baked brick from a kiln on clay land at the lower side of the village,

the monotonous diet of corn and beans. The fruits are of subtropical and middle-latitude varieties, fig, prickly pear, apple, pear, peach, apricot, quince, pomegranate. The only representative tropical fruit is the relatively hardy zapote blanco. Olive trees are plentiful, and the fruit is used both as a food cured in vinegar and for oil. The vegetables are of common middle-latitude varieties, squash, chili pepper, tomato, onion, beet, turnip, cabbage, cauliflower, radish, sesame. With some irrigation from shallow

March, 64°F. Mean annual precipitation, 1900–1926, 26 inches; absolute maximum, 1925, 39 inches; absolute minimum, 1915, 15 inches "Atlas climatológico de la República Mexicana, 1921–1925." (Servicio Meteorológico Mexicano, Dirección de Estudios Geográficos y Climatológicos.)

wells, of which there is one in every courtyard, vegetables are produced throughout the year.

*Reclaimed Fields.* The fourth type of land is an extension of the village gardens, fields reclaimed by drainage along the "water front," reaching out like piers into the wet plain (Figs. 14 and 19). The area of such land is about 50 acres, 2 per cent of the community. The soil is heavy, in contrast with that

of the small fields, and corn is common in larger ones; but the most characteristic crop is alfalfa (Figs. 19 and 22). This crop yields well under regular irrigation, growing eight cuttings a year, in contrast with an unsatisfactory yield of two cuttings if dependent only on precipitation in the rainy season. Therefore its production is confined to the reclaimed land, where low position makes possible irrigation



FIG. 21.—Within the courtyard of a village house, Magdalena Atlipac. The housewife preparing corn for tortillas on her stone metate. The well, hardly visible because of its low curb, in the middle background. The vegetable garden and fruit trees in the right background. A neighbor's house of typical design and construction (adobe brick trimmed with stone and baked brick) in the left background.

on the slopes above. Reclamation is accomplished by completely surrounding the land in question with a ditch and dike and adding to the dike not only the earth from the ditch but also the surface soil scraped off the land. Thus the water table is lowered by seepage into the ditch, alkali is removed with the surface soil, and in course of time any alkali remaining is carried away in solution by rain water seeping down through the soil.

Beets are generally the first crop on such land. Later, chili peppers and other vegetables are grown in a few

with artesian water (Fig. 14). Wells bored to a depth of about 200 feet reach water under sufficient pressure to flow without pumping anywhere on the lower side of the highway. The tapping of this resource, with the accompanying production of alfalfa for winter fodder, is a modern matter, developed within the last thirty years. The wells, of which there are now at least 12, are uncased and uncapped and flow unchecked, rapidly wasting the water by outflow on the lake plain. Already the pressure has diminished considerably.

**Wet Plain.** The unreclaimed wet plain is the fifth and last type of land, occupying 10 per cent of the area, 250 acres (Figs. 14 and 22). The waters of Lake Texcoco have been drained off, but the flat lake bed is still marshy. All of it is marshy during the rainy season, and the part near the village is marshy even during the dry season, because of water poured out by the uncapped artesian wells.

numbers, constituting an average of only a few poultry and one or two small animals to each family, and one draft animal and one cow to every two or three families. These figures indicate that livestock forms a small part of the resources of the community.

Part of the lake plain not only is unavailable for agriculture but, on account of alkali, is bare of grass and unavailable even for pasturage. The



FIG. 22.—An alfalfa field, Magdalena Atlipac. Border of maguey at the right; one plant in production, indicated by leaves bent over. View looking west from the village toward the wet lake plain.

This incidental artesian irrigation is of some advantage in providing green forage at a time when mountains and fields are dry and even much of the lake bed itself is brown and dusty. Here pasturage is available for village livestock, smaller in extent than the mountain, but better, at least in the dry season. Poultry and pigs as well as larger animals feed on the plain. It is estimated that the community has, altogether, about 80 donkeys and horses, 80 cows, 200 pigs, 200 goats, 100 sheep, 600 chickens, 200 turkeys, 200 ducks, 100 geese—rather small

surface deposit, having a high content of sodium nitrate, is gathered annually in one such spot and sold in the city to a chemical plant (Fig. 14).

Most of the wet land beyond the vicinity of the village is not subject to easy reclamation at present, but it is possible that sometime a larger drainage project for Lake Texcoco might make it all available for cultivation.

Such are the types of land and their characteristics. In general, they are clear-cut and easily recognized; their contrasts are fairly obvious. More could be said of them as separate

entities—of their soil, topography, and natural vegetation, of their adaptation to one sort of use or another. But such further discussion would be tedious. A different aspect, which has been neglected thus far, is the relationship of these land types to each other and their position and functions in the living pattern of terrene occupancy.

**PATTERN OF OCCUPANCE.** We are dealing not merely with five separate

at the lower margin of the cornland, where the workers live close to their fields, where water is available, and where the highway skirting the lake gives access to the outside world (Fig. 15); (3) the reclaimed land pushing out from the village into the lake; and finally, in the background, (4) the mountain slope on one side and (5) the wet plain on the other, outlying areas of minor importance,



FIG. 23.—A gathering of people of Magdalena Vilpac in the plaza. In the background, the school at the right and the courtroom at the left.

and contrasted areas of land used in separate and distinct ways but with areal members of a community, each having its place and functions in a unit of organization, and this community itself having its place in a larger region composed of many similar communities with larger functions.

Accordingly the five types of land are not to be considered as items in a list but to be viewed in their mutual relations, as follows: (1) the fertile strip of cornfields as the basis of development, conditioning the character of the community; (2) the village established

acceptable adjuncts by reason of their chance proximity, making subordinate contributions to the life of the community.

The only excuse for discussing these types in numerical order from east to west beginning with the mountain is to bring out the contrast between such an undiscriminating arrangement and the more penetrating view of their relations to the community as a whole, namely: the cornfields as the basis of subsistence; the village as a phenomenon of location with reference to the fields and highway and not merely

as a feature of the land on which it stands; the mountain and wet plain as incidental accessories.

The pueblo is essentially a community of subsistence farmers (Fig. 23), about 200 families, living together on the old lake shore, cultivating the adjacent strip of fertile land as their main source of livelihood, engaging in a few secondary activities, and using

and 2 acres on the wet plain. It requires less than the average holding of good land to produce the regular food supply for a family, but it requires more than the average to provide a surplus to exchange for clothing and other necessities. Therefore, men with less than 6 acres of good land generally do some work for wages or engage in other minor occupations.

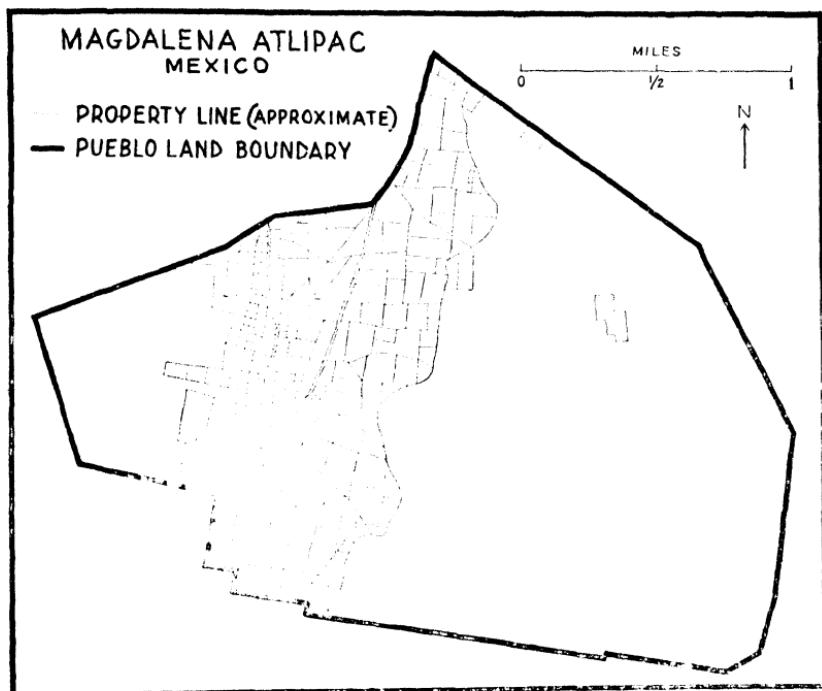


FIG. 24.—Property divisions of the pueblo.

small resources of mountain and plain to supply various needs.

**LAND TENURE.** Each family has its home in the village, its cultivated land on the fertile slope (Fig. 24), a share of the mountain, and a share of the wet plain, there being thus illustrated recognition of land types from time immemorial. An average family holding is  $\frac{1}{3}$  acre in the village, 3 acres on the fertile slope, 8 acres on the mountain,

Whereas the farm land was held in common originally and was then divided equally among the householders in the nineteenth century, there is now considerable inequality, by reason of buying and selling among the members of the community and division among children. Therefore the present pattern of land ownership represents a modification of the ideal relationship of each family to its

supporting land. Modification nevertheless has been kept relatively slight under the restraint of the same necessities of family support that have governed the size of the community and conditioned the original allotment of land.

Small divisions in the village and large ones in the fertile land are in evidence, while the absence of divisions on the mountain and on the wet plain is likewise indicative of the natural situation (Fig. 24). These areas were

plaza form the appropriate concourse of a residence place (Fig. 23). The only sign of commercial centrality is in five little stores, which are more like delicatessen shops than like rural general stores and which by their very meagerness emphasize the noncommercial character of the households here grouped together. These stores do not represent quite all the commercial activity. There is some peddling, partly of surplus produce by housewives of the village and partly of dry goods and

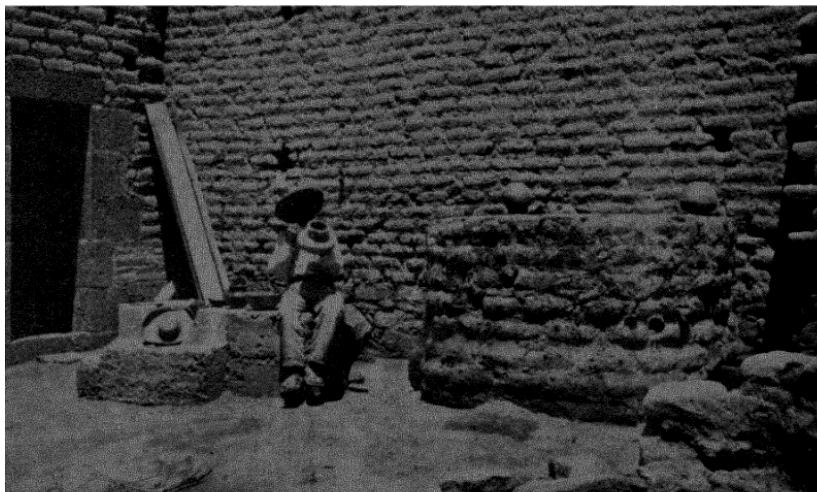


FIG. 25.—The potter of Magdalena Atlipac in his courtyard. Pottery oven at right.

held in common until recently; and, even now, when allotments have been made dividing them up, they are still used in common, for the pasturage of flocks and herds in the only practicable way, the small divisions being of slight significance as separate holdings. On the wet plain, however, reclamation by diking and ditching is a private matter of small plots and therefore, as far as it is extended, tends to further and perpetuate private control.

**COMMUNITY FUNCTIONS.** The village is a dwelling place, not a commercial center. The old church and the modern school and courtroom on the

other supplies by itinerant peddlers. Also, there is some outflow of products from the community by bus to the markets of Texcoco or Mexico City, and some inflow of supplies from these markets, trade accomplished without middlemen. But these movements are of minor proportions.

Accordingly, occupational specialization is slight, except such specialization as there is in each family, the men working in the fields and the women in the homes. The teacher, a full-time specialist, is an exception, and the same is true of the potter (Fig. 25). In general, other occupations

are side lines. This is the case with cobbler, carpenter, mason, quarrymen, brickmaker, pulque maker, broom-makers, nitrate gatherers, and herb gatherers. Most of these perform their

resources but wander away occasionally to other areas in search of their products, owing their marked success to special knowledge of the plants sought, transmitted from father to

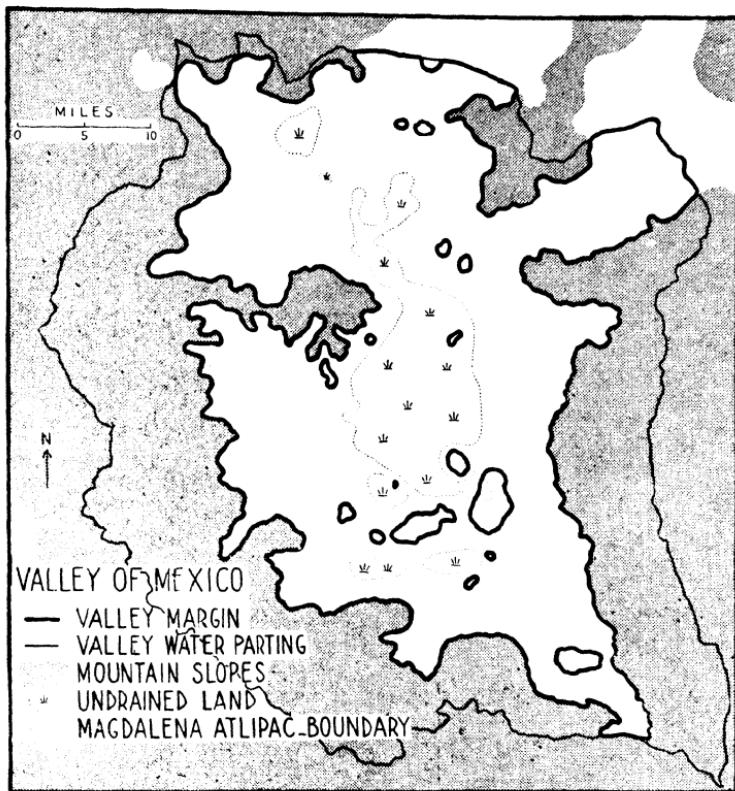


FIG. 26. Land forms of the Valley of Mexico. The "Valley margin" shown on the map is the edge of continuous smooth land within the basin. Mountains within the valley are not shaded as mountain slopes. A remnant of Lake Texcoco occupies the lowest part of the "undrained" area. (*This and other maps of the Valley of Mexico based on topographic sheets of La Dirección de Estudios Geográficos y Climatológicos, Secretaría de Agricultura y Fomento, 1:100,000.*)

special services when required in the community. A few, particularly broom-makers, nitrate gatherers, and herb gatherers, spend part of their time producing from local resources commodities for sale elsewhere. As a matter of fact, the herb gatherers do not confine their attention to local

son, particularly in one prominent family.

With so little division of labor and small commercial activity the community is a unit of a different sort from a farm village in the United States. Whereas there is marked interdependence based on specialization

and commercialization in an American community, the households of Magdalena Atlipac are fairly independent of each other in their supporting functions. In an American community the pattern of transportation routes gives form to the district, local roads focusing on a commercial center to connect with trunk lines. In Magdalena Atlipac the local transportation pattern is no more than a convergence of paths from fields to dwelling place, having but slight connection with through traffic on the highway and no connection with the railway (Fig. 15). There is no station; trains pass whistling through the fields and never stop.

On the other hand, the social solidarity of Magdalena Atlipac is greater than that of an American community. The farmers live together, feel that their village and their lands pertain to all of them, and govern themselves by common consent. The boundary of the community is of vital concern to them all, to be maintained by them and distinguishing them from the neighboring pueblos and haciendas whose lands abut on theirs (Fig. 15). This boundary, fixed by their ancestors, represents the land need and landholding capacity of a minimum population group, small enough to adhere to the soil and large enough to defend itself and its land. The boundary defines a clear unit, both in size and in location, fitting into the natural environment. It is hardly discernible in the visible landscape, but it is a notable feature of the pattern of terrene occupancy.

**VALLEY OF MEXICO.** The community of Magdalena Atlipac is one cell in a greater areal social organism of which the physical body is the Valley of Mexico (Fig. 26). The Valley is essentially a high plateau basin rather than a true valley. From its margin, steep mountain slopes rise to a high divide around most of the Valley. In some places, however, the divide is low, and across it the slopes fall away immedi-

ately, either steeply to lower valleys or gently to basins that are practically extensions of the Valley of Mexico. The canal that drains the lakes cuts the divide at a low point near the northwest corner of the Valley.

In the Valley, Magdalena Atlipac is one among four hundred small communities—pueblos, haciendas, and ranchos (Fig. 27). The distribution of these communities is characteristic. They occupy the good land around the Valley. Magdalena Atlipac is seen to be one of a row of pueblos in the strip of good land between Lake Texcoco and mountains within the Valley. Similar strips are identified elsewhere. Broader areas of good land are occupied by groups of villages. Some detached areas of good land on the mountains are occupied by settlements perched above the Valley. The steep slopes and marshy lake beds are avoided, except as outlying tracts to be used for what they are worth, if conveniently near at hand.

Most of these hundreds of communities are like Magdalena Atlipac in containing a group of people living together and tilling the soil of an adjacent area of farm land. For the most part, their resources and activities are similar.

In organization, however, there are well-defined differences among them. On the map (Fig. 27) they are divided into pueblos and haciendas and ranchos. Ranchos generally are smaller than haciendas; but since there are no other marked differences and even in the matter of size there is not an invariable distinction, haciendas and ranchos are grouped together on the map. In many cases, ranchos as well as haciendas are estates of commercial proportions, each containing a village community. There are almost no isolated farmers in the Valley, but only village groups with farm lands about them.

The differences between pueblos and haciendas are better known than their

similarities, by reason of the bitter struggle that has taken place between them as antagonistic social, economic, and political units—the pueblos as Indian communities with democratic control of themselves and their land,

land the villagers were forced to work for the new owner, on the same old land, to make a living.

From a geographic standpoint there is great similarity between pueblos and haciendas. In either case, there is a

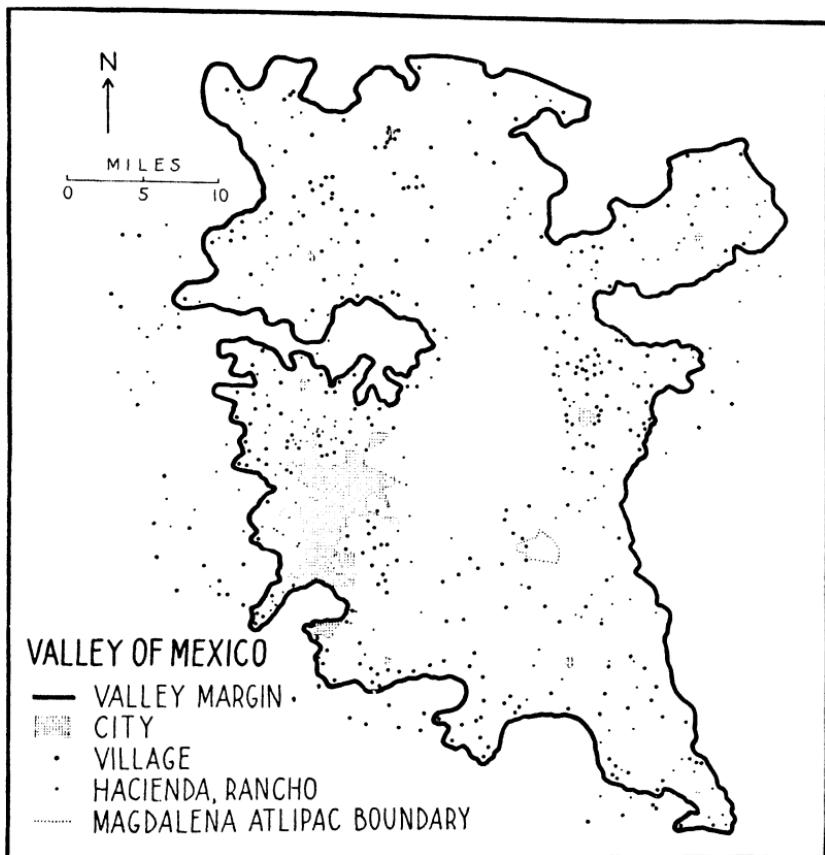


FIG. 27.—Population groups of the Valley of Mexico, most of them on the smooth land of the valley bottom, a few on slopes overlooking the valley. The word "village" as used in the legend is equivalent to "pueblo."

the haciendas as private estates originating from Spanish conquest with aristocratic control of the land and of the people on it. Until recently the haciendas were encroaching on the pueblos, acquiring their farm land, the critical resource. After losing their

group of people living together and making their livelihood from the cultivation of near-by farm land. Only in certain particulars are there marked differences in land occupancy, and these may be simply stated. These differences are based on the following

facts: (1) The dominance of the haciendas has resulted in their acquisition of much land at the expense of the pueblos but has not given them correspondingly firm control over labor, by reason of the obvious impossibility of controlling people as easily as land. Therefore, the haciendas are relatively rich in land and poor in labor in contrast to the pueblos. (2) The dominance of the haciendas has given them not only much land but the more desirable land at the expense of the pueblos. Particularly have they acquired the lion's share of irrigable land and water rights, which are better adapted to large- than to small-scale utilization. (3) The land and people of the hacienda are organized as one large economic unit, whereas the families of the pueblo and their bits of land are operated as small separate productive units.

Some results of these facts appear in the pattern of occupancy. (1) In haciendas the fields are larger than in pueblos. (2) A much larger proportion of the land is occupied by maguey; in fact, maguey may be considered a characteristic hacienda crop, for reasons already given—its slow growth to maturity and its need of little cultivation but regular attention to production by specialists on a commercial scale, making it suitable for large-scale enterprises rich in land and poor in labor. (3) Wheat is another characteristic hacienda crop, introduced from Europe, having a relatively low yield per acre, not desired by the farmers producing corn for home supply but in demand commercially, and confined to irrigated land because the rainy summer does not fit the needs of spring wheat and the dry winter is unsatisfactory for winter wheat except under irrigation. Alfalfa also is grown more in haciendas than in pueblos; but its high productivity and utility as a supply crop even on a small scale give it a place in pueblo agriculture, as already indicated, and the larger amount in

haciendas is accounted for primarily by their larger share of irrigated land. (4) The village group in an hacienda is likely to be more regular in appearance and to have a conspicuous manor house and large storehouses and barns. In general, it may be said that the haciendas are centralized establishments gathering in and marketing commercially not only pulque or wheat but also milk or meat or even such products as corn and beans, which in the pueblos are consumed mostly by the producers.

In recent years of revolution, power has passed from the haciendas, and the pueblos in their turn have been encroaching on the estates. As might be expected, the change is not accompanied by great movements of population or by new methods of cultivation, since the same people are working in the same places; but it is accompanied by minor changes in the features of land occupancy that have been mentioned as different in haciendas and pueblos—division of large fields into small fields, rooting up of maguey on good land and its neglect on poor land, replacement of wheat by corn and beans, and weakening of commercial machinery and commercial production.

Such are the pueblos and haciendas, the small units close to the soil. Each has its own life; and, in the case of the pueblos at least, this life is largely a matter of internal activity rather than of external relations with other pueblos or with larger units, like cells relatively inert with reference to the body in which they live. Nevertheless, even such a self-contained unit as Magdalena Atlipac has some interchange, now steadily increasing, with other and larger centers.

In the pattern of occupancy these external relations of the small communities are expressed most obviously in market towns, strategically placed here and there in the Valley, each a center of interest for many villages

(Figs. 27 and 11).<sup>1</sup> People of Magdalena Atlipac go, as already mentioned, to market in Texcoco, to sell from their

Valley. Country people even walk over the mountains from the neighboring Valley of Toluca (Fig. 28) to sell and

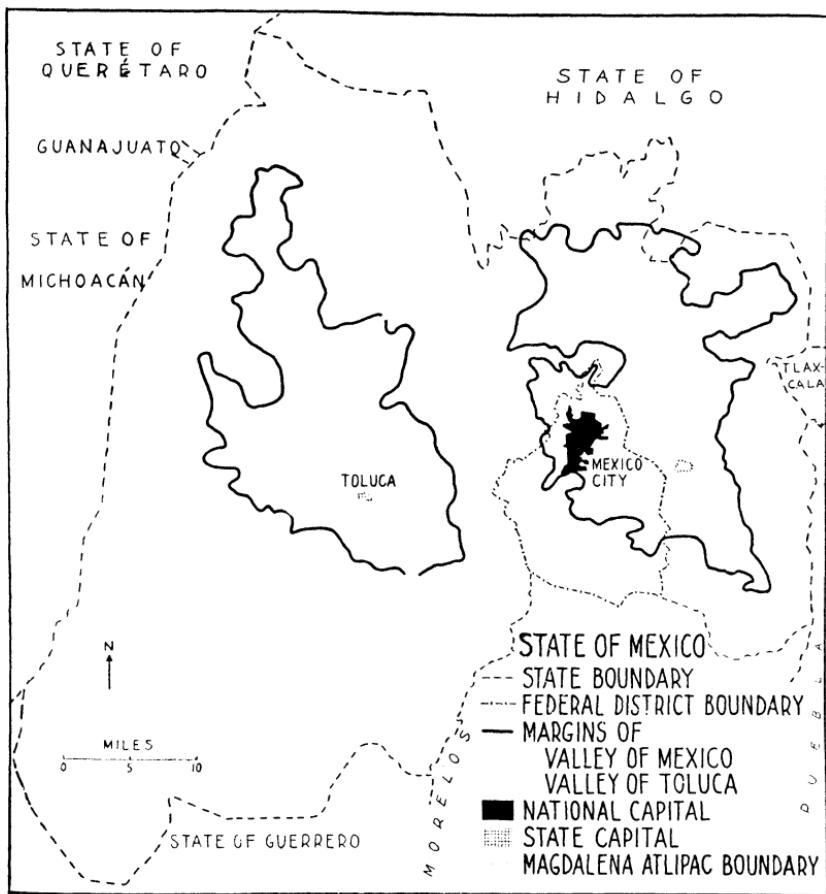


FIG. 28.—The two "Valleys" of the state of Mexico. The Federal District, containing Mexico City, is an enclave nearly surrounded by the state. Magdalena Atlipac is outside the Federal District and in the state of Mexico, of which Toluca is the capital. The boundaries of the state are mainly in the mountainous areas surrounding the basins.

scanty surplus and buy for their meager needs. They are near the periphery of the district of Texcoco and go frequently in the opposite direction to the larger markets of Mexico City. This is the major center for the whole

buy at the great markets of the metropolis. Thus Mexico City is seen to be the chief market center of a large rural district.

Obviously the city is much more than this—a commercial and manu-

<sup>1</sup> Each of the cities shown in Fig. 27 has a market. Texcoco is in the middle of the east side of the Valley.

facturing center for the whole region of the Central Plateau, a political, financial, and social center for the

basins surrounded by mountains are a fundamental feature of the Central Plateau (Fig. 29)—in fact, they domi-

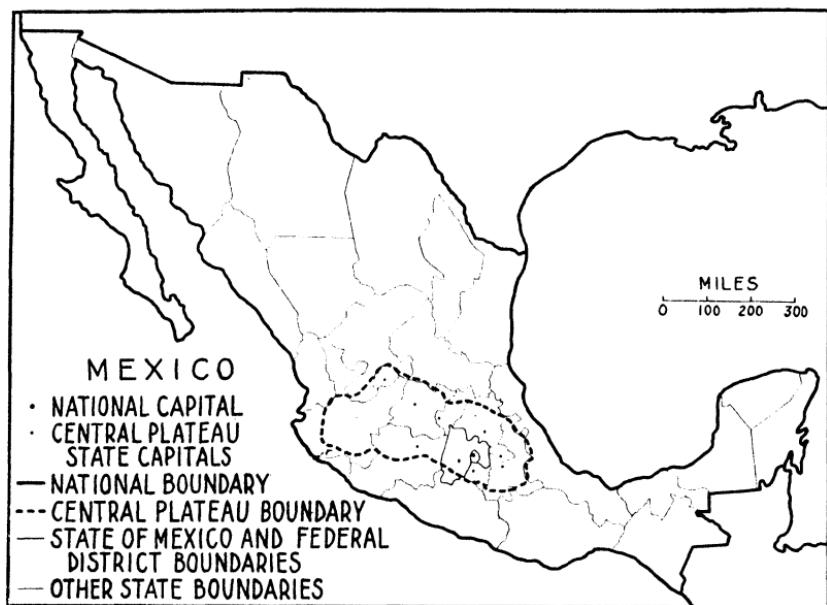


FIG. 29.—The state of Mexico and the federal district in the Central Plateau, the other state capitals in the Central Plateau, and the state divisions of the outlying regions of Mexico.

whole nation. But analysis of the city is beyond the scope of this study.

The Valley of Mexico is a cluster of village communities, each acting more or less independently, but with increasing interests focusing on Mexico City. Such community clusters in valleys or

nate the Central Plateau as a phenomenon of land occupancy—each population group having its pueblos and haciendas, its market towns and city center, and its sparsely populated outlying mountain districts separating it from other groups.

## 2. JAJALPA<sup>1</sup>

### AN HACIENDA IN THE CENTRAL PLATEAU

Hacienda Jajalpa is on the margin of one of the Central Plateau basins, the Valley of Toluca, at an altitude of between 9,000 and 10,000 feet above the sea [Fig. 9(2)]. The lowest part of the hacienda is an alluvial plain, a narrow projection of the smooth floor of the Toluca basin, extending into

the bordering range of mountains. The highest part is a mountain spur overlooking the basin.

At this altitude there is a long season of moderate warmth and a short season of frost. The annual rainfall is about 30 inches, of which a major part falls in summer.

<sup>1</sup> Field work in February, 1936.



FIG. 30.—The *casa grande* of Hacienda Jajalpa. The owner's family in the courtyard. View looking northeast, across fields to wooded slopes in the background.

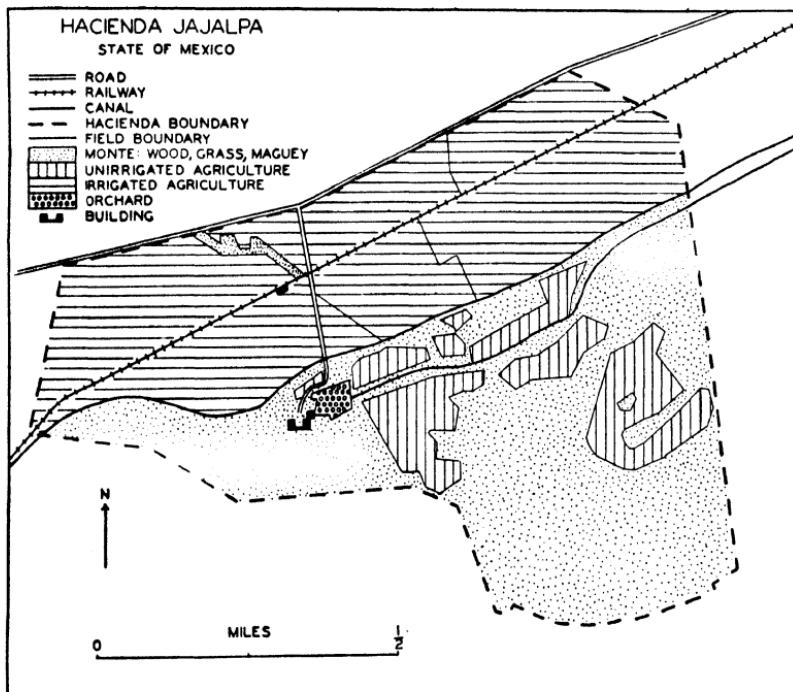


FIG. 31.—Land use in the hacienda as recently constituted, not including land expropriated for allotment to neighboring pueblos.

**RESIDUAL PROPERTY.** Formerly the hacienda had an area of 2,400 acres. In recent years of agrarian reform it has been reduced to 380 acres by the expropriation of 2,020 acres for the benefit of neighboring pueblos. Seven land-hungry villages have acquired outlying tracts, some good and some poor, reducing the hacienda to a residual remnant, 16 per cent of the

that forms the northern half of the property is nearly all cultivable and irrigable (Fig. 32). The soil is fertile brown silt loam. The mountain stream of the valley provides water for irrigation, conducted in a canal along the south edge of the lowland and supplying a share to other users along the valley, as well as to the hacienda. Water is not a critical element in

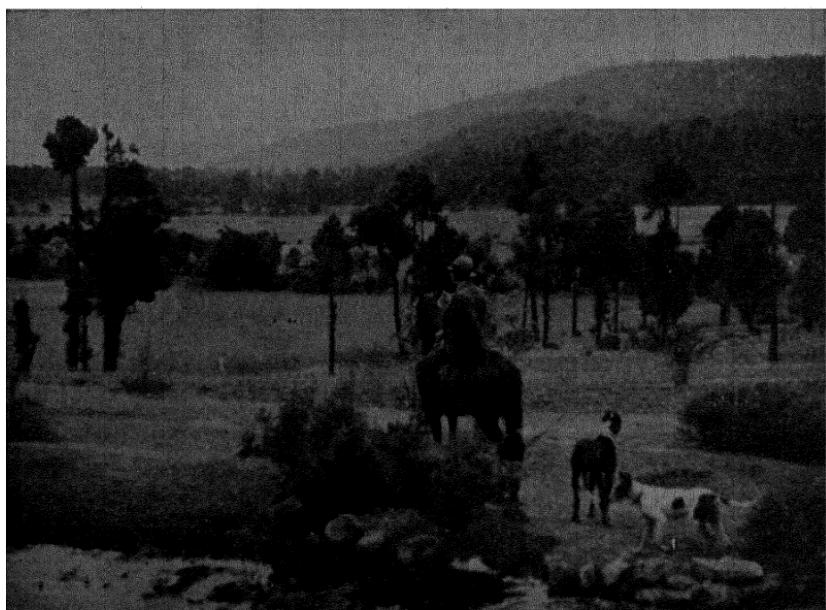


FIG. 32.—View northward across valley fields of Jajalpa. Pine trees on mountain slopes and in field borders; irrigation ditch along the valley side in the immediate foreground; the owner on horseback.

former establishment. But the expropriation has been made in such a way as to leave to the *hacendero* not only the central group of hacienda buildings (Fig. 30) but also an area of the best agricultural land in the alluvial plain as well as ridge land of use for other purposes. This is all a compact area, 1 mile long and  $\frac{1}{2}$  mile wide, of sufficient size to form a relatively large-scale farming unit (Fig. 31).

**VALLEY LAND.** The valley plain

production; for rainfall provides much of what is needed, and the canal brings an ample share to the fields of the hacienda.

Most of the irrigable land is in corn and wheat, grown in rotation, corn for two years in succession and wheat for one year. Corn needs little or no irrigation, for its growing season from March to October coincides with the rainy season. Wheat is of the winter variety and needs irrigation during

the early part of its growing season, which extends from December to July.

A little of the irrigable land, 35 acres, is in alfalfa, which occupies the land continuously for about eight years and yields four or five cuttings a year. The amount planted is governed by the needs of the establishment for supplementary fodder.

**RIDGE LAND.** The mountain spur forming the southern half of the property is rocky and steep in many places but includes irregular patches of fertile gently sloping land (Fig. 31). The larger of these patches are used as fields for unirrigated crops of the hacienda, particularly corn and barley, which grow through the rainy season. Smaller patches are allotted to laborers of the hacienda for growing a home supply of corn and beans. One patch near the owner's house on the lower slope of the ridge is an orchard of apples, pears, and plums, regularly irrigated by water from a small secondary canal.

Altogether the hacienda has about 260 acres of cultivated land, 67 per cent of the total area. The remaining 120 acres is stonier land on the ridge and is occupied by an open woodland of pines and oaks with grass between. In the past, this land was used occasionally as pasture for livestock and to provide firewood for the inhabitants. Now that the hacienda is not so rich in land as it used to be, more intensive use is being made of the uncultivable area. The natural grass cover is used for pasture more than formerly. Also, maguey is planted here and there in open areas. Because this common hacienda crop (which is grown in valley fields when land is plentiful) needs neither cultivation nor irrigation and thrives in the shallow soils of rocky slopes, it may well be relegated to uncultivable ridge land when good land is scarce.

**HACIENDA ECONOMY.** On the basis of this assortment of lands the present

economy of Jajalpa has developed. A dairy herd of a hundred cows feeds on the natural mountain pastures and on alfalfa and the fodder of grainfields. They are a well-bred cross of Holstein-Friesian and Swiss cattle and are cared for well, with modern dairy equipment. Milk for an urban market is the product.

A hundred maguey plants in production are tapped by three pulque makers, and the product of 300 liters is sent to an urban market. The grains—wheat, barley, and corn—likewise are produced chiefly for sale.

Marketing is easy, for the hacienda is on the line of transportation between Mexico City and Toluca. Both railway and highway follow the valley of Jajalpa on the west slope of the mountain range that separates the two basins of Mexico and Toluca. The milk of the hacienda is taken by truck to Mexico City, and the pulque by truck to Toluca. Presumably the reason for this difference in market is that the Valley of Toluca is a place of dairy farms and not of maguey plantations, so that the movement of milk is eastward out of the basin and the movement of pulque westward into the basin, in each case away from the main producing area and toward a market.

Thus to the owner the hacienda is a means of income from several productive sources. To the 40 laborers who live on the property the hacienda is a place of dwelling and subsistence and wagework. Each has his acre of corn, two sheep provided by the owner, and whatever other livestock he may accumulate—cattle, pigs, and chickens.

The laborers are of Indian or mestizo blood and speak Spanish. The owner and his wife are of Spanish Colonial ancestry and are cultured and well-educated. They have a house in Mexico City and professional business there, so that the hacienda is of secondary importance both as a dwelling place and as a source of income.

3. SAN RAFAEL<sup>1</sup>

## A SILVER MINE IN THE CENTRAL PLATEAU

The Central Plateau includes in its physical structure not only areas of recent volcanic materials and unconsolidated deposits but also areas of older rock. In the mountains north of the Valley of Mexico, for instance [Fig. 9(3)], is faulted traprock of Tertiary

west line and extends downward from the outcrop, dipping southward at an angle of nearly eighty degrees. In the weathered zone within 300 feet of the surface, mineralization is lacking, but silver ore is formed at 300 feet down to the greatest depth to which mining

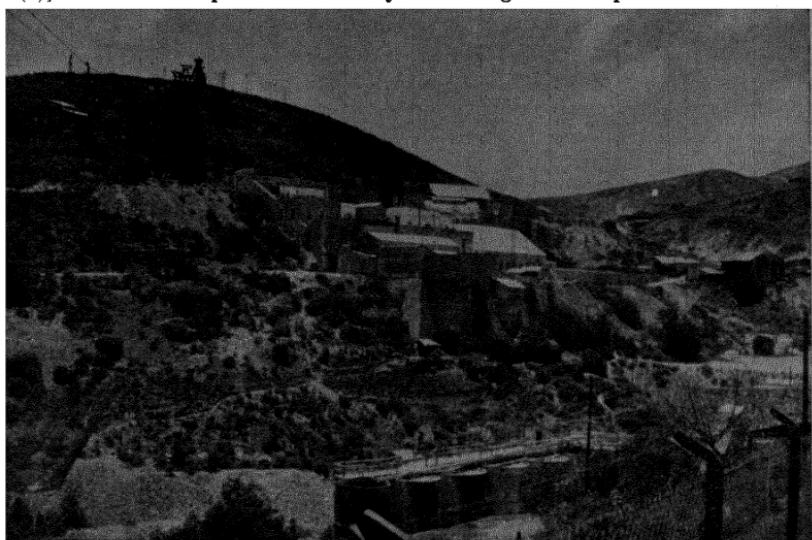


FIG. 33. San Rafael Mine. Buildings around the main shaft on the opposite side of the ravine. Mill buildings at the lower right.

age, marked by quartz veins apparently deposited in fissures by rising thermal waters. Concentrations of metallic minerals occur in a few places in some of the veins.

The mother lode near Pachuca is an irregular quartz vein at least ten miles long. It varies in width from 5 to 50 feet and has numerous branches. Concentrations of silver ore extend for a distance of a mile and are localized, for the most part, at junctions in the vein and its branches.

The vein outcrops along an east-

has penetrated, now about 2,000 feet. The richest deposits have been located at a depth of about 1,000 feet.

**THE MINE.** The San Rafael Mine (Fig. 33), now third in size among the mines of the district, was formed by consolidation of seven individual mines, which in turn were composed of 123 parcels of property. It covers a total area of about 300 acres and contains a half-mile length of the mother lode. The present company was founded in 1874, but mining on the same site began considerably earlier.

<sup>1</sup> Field work in August, 1928.

Mexican stockholders control the corporation; American technicians, 15 in number, are employed to operate the enterprise; and 1,200 Mexican laborers work either above- or underground.

**FORM AND FUNCTION.** The ore is reached by vertical shafts—seven of them formerly, one for each of the older mines, lined up east and west along the vein; but only two shafts now serve the whole consolidated property. Operations underground are in accordance with modern American mining techniques adapted to local circumstances. The levels (nine now working) are 40 meters apart; there are drifts along the vein; and stopes are filled with waste rock from ore sorting and dead work. Drilling is with compressed air. Transportation of ore is by chutes from stope to drift, by tramcars pushed along in drifts and crosscuts, and by electric hoist in shafts to the surface.

Timbering is needed on account of the fractured state of the rock. It is needed particularly in a part of the mine where, years ago, an extensive cave-in occurred due to inadequate support of the weak rock structure and where the ore left previously in mine pillars is now being extracted. A satisfactory and economical supply of pine timber is available from forested mountains near by.

Pumping is needed to free the mine of water, but the normal amount of water pumped is hardly sufficient for water supply. The large water requirements of the San Rafael stamp mill are met by a supply from a neighboring mine. Nevertheless, adequate pumping facilities are needed to guard against floods in periods of unusual rainfall. At one time in the history of the mine a great flood stopped operations and drowned lower levels for three years. Thereafter a tunnel one mile long was driven, beneath intervening high land, from a level of the mine to a lower surface elevation in the valley where Pachuca is located.

Through this exit, surplus water flows from the mine and the danger of floods is eliminated, at least for upper levels. The tunnel is used also for transport of men and materials between the city and the mine.

Ventilation of the mine is not a serious problem, but in recent years a system of forced draft has been installed to check increasing temperatures at increasing depth.

Power for the mine and mill is provided by a hydroelectric plant twenty miles down valley to the northeast. Until this new installation was made San Rafael was handicapped for lack of power; drilling was done by hand, and mill operations were limited.

About eight hundred tons of ore are hoisted daily to the surface and there delivered at the top of the stamp mill, which occupies a convenient slope below the mine mouth. The mill performs its function of disposing of the bulk of waste matter in the ore, more than 99 per cent of ore weight, and recovering the  $\frac{1}{2}$  ton of silver and 6 pounds of gold in a day's output, through standard processes of crushing in stamp, ball, rod, and tube mills, separating by gravity, dissolving with cyanide, and separating by precipitation. The troublesome residue of ore tailings is washed down the valley, piped through Pachuca, and deposited in an available area of lowland beyond the city. The recovered mixture of metals is melted and cast into bars to be delivered weekly by truck to the Real del Monte refinery (the major refinery of the Pachuca district) a few miles away, whence a large fraction of the world's silver and a very small fraction of the world's gold are shipped to the world market.

The cost of mining and milling 1 ton of ore at San Rafael is ordinarily about \$4, and the value of the silver and gold content is about \$5. The mine has operated profitably and, at least in years past, has yielded satisfactory returns to its Mexican owners.

4. TLAHUALILO<sup>1</sup>

## AN HACIENDA IN THE NORTHERN HIGHLANDS

Most of northern Mexico is too arid for agriculture without irrigation. Places that are not too arid are too rugged, being only the upper slopes of the higher mountains. Therefore, the best agricultural possibilities are in the utilization of mountain rainfall to irrigate plains.

An indication of aridity is seen in extensive areas of interior drainage. All these areas have some rainfall and some streams within them, but most of them consist of desert basins and low dry mountains with little rainfall and few streams. The one containing the greatest area of high mountains is the basin of the Nazas and Aguanaval rivers. Seasonal rainfall in the Sierra Madre Occidental is collected by a network of headwater streams and poured down the two river valleys and out of the mountains into the broad basin of the Laguna. The amount of water delivered at the mouth of the two canyons is greater than that at any other place in any of the interior basins. This is the natural basis for the greatest irrigation district in the Northern Plateau [Fig. 9(4)].

**LAGUNA DISTRICT.** Where the rivers break from the mountains, canals lead off from them to distribute water to fields laid out on the desert plain (Fig. 34). The pattern is simple and distinct: the runoff from thirty thousand square miles of mountains, accumulated and carried down by two rivers, distributed by a network of canals over the plain.

The features of the pattern include not only the canals ramifying from the rivers, but also the fields that they water and that produce crops, and property divisions with their water

rights laid out for systematic development of agriculture (Fig. 35). The greater subdivision of property in the area of irrigation is evident. The pattern includes also a network of transportation lines supplying the needs and carrying out the products of the fields, villages to house the workers, and commercial centers to serve the area (Fig. 36). The chief city is Torreón, at the point where the rivers leave the mountains. These features and many more fit into their places in the whole complex pattern of land occupancy.

**HACIENDA.** Some details of the pattern may be illustrated by the one hacienda of Tlahualilo, a property unit organized as a producing unit (Fig. 35). The plantation occupies a basin of almost flat land, 30 miles long and 10 miles wide, between low mountain ranges. It has rights to a share of water from the Nazas River, part of these rights being derived from ownership of another plantation at the mouth of the Nazas Canyon, which happened to possess large water rights but very little good land. The Tlahualilo canal traverses fifty miles of desert plain from the Nazas River to the plantation (Figs. 34 and 37) at the hardly sufficient gradient of 5 inches per mile, passes along the higher western edge of the property, and delivers its water to secondary canals, which in turn distribute to smaller canals and ditches emptying into diked fields.

The property has an area of about 280 square miles. Of this, 100 square miles are good land, flat and fertile. Two-thirds of this good land, about 45,000 acres, are prepared for irrigation, restriction to this amount being

<sup>1</sup> Field work in July, 1928. R. S. PLATT, Pattern of Land Occupancy in the Mexican Laguna District, *Transactions of the Illinois State Academy of Science*, Vol. 22 (1930), pp. 533-541.

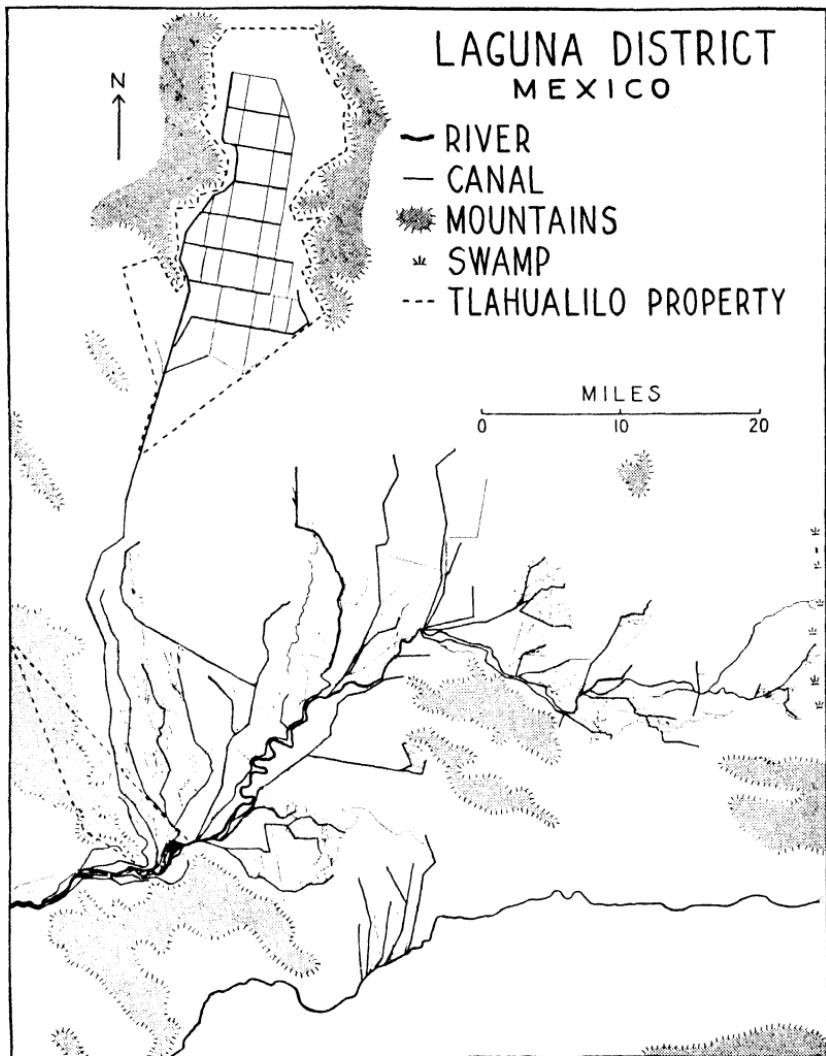


FIG. 34.—Irrigation canals of the Laguna District, including the main canal and secondary canals of Hacienda Tlahualilo.

due to the limitation of available water. The area has been reduced somewhat in recent years by reason of the confiscation of some water rights for the benefit of smaller farms.

**PATTERN.** The plantation is managed from a central headquarters

town. But being too large for central control of farm operations, its agricultural land is divided for farming purposes into twelve ranchos, some of them irregular in form where broken by hills or property boundaries, but the others of standard size, approxi-

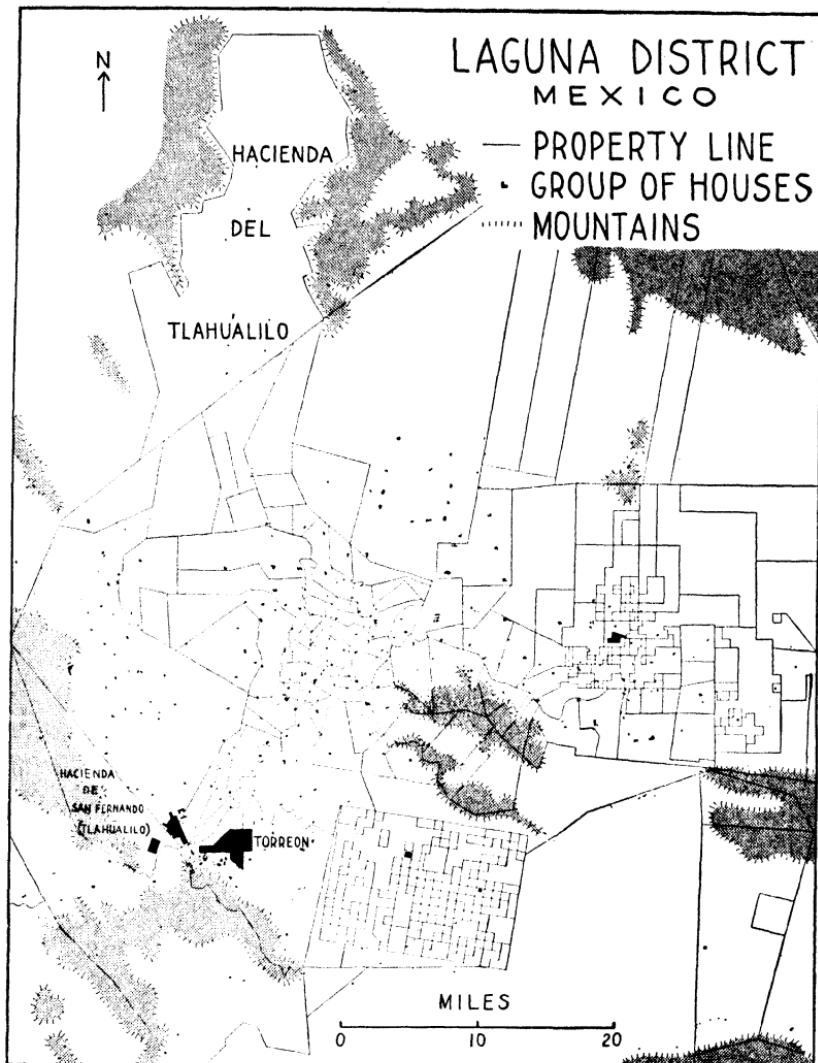


FIG. 35.—Property divisions and house groups of the Laguna District. Most of the divisions are small in irrigated areas and large in unirrigated areas. Hacienda Tlahualilo, a large property, was unirrigated until a long canal for a large project was constructed.

mately 2.5 miles square, containing about four thousand acres, a convenient farming unit. (These are distinguished in Fig. 38 as squares bordered by canals and bisected by a north-south canal.)

For convenience of cultivation each rancho is divided into fields of 30 acres, there being 128 such fields in a rancho of standard size. The fields are rectangles 500 meters long and 250 meters wide (the smallest divisions shown in Fig.

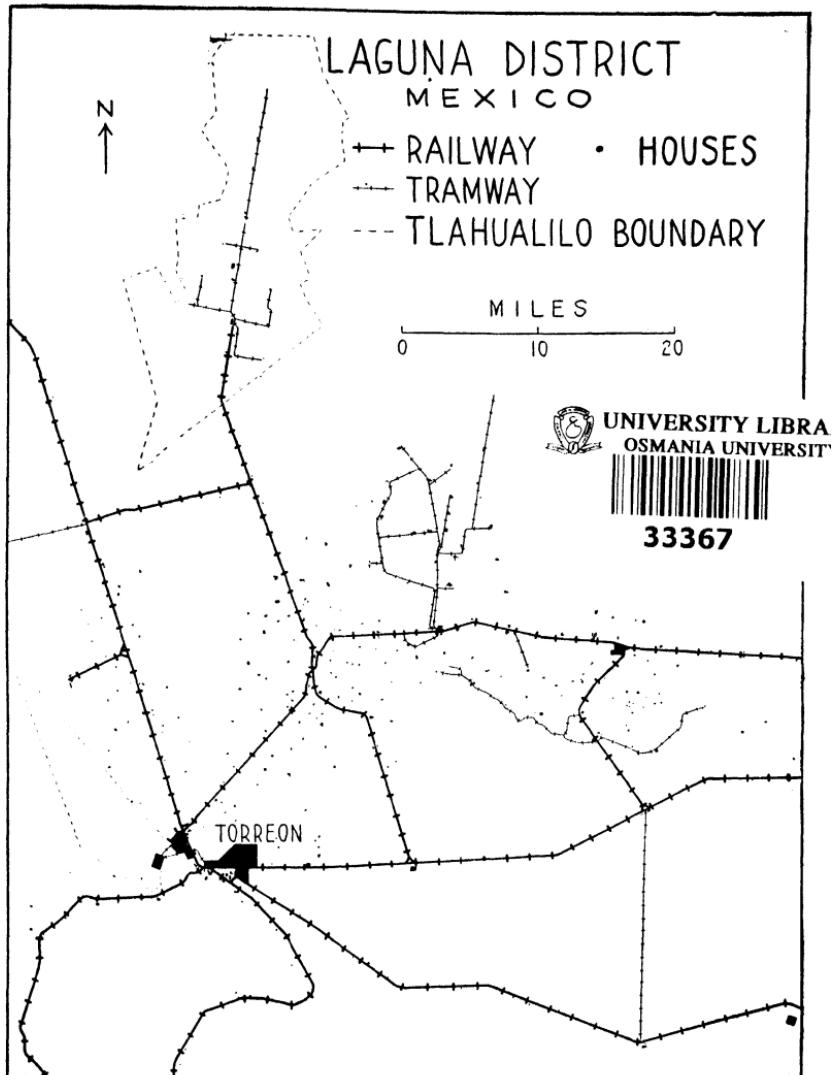


FIG. 36.—Transportation lines of the Laguna District, including the tramway system of Hacienda Tlahualilo.

88), in each rancho 16 east-west rows of fields with eight fields in each row. These 30-acre units are as large as practicable for effective irrigation, larger than would be possible except on smooth land. Every field is bounded

by dikes and reached by irrigation ditches.

Only about half the fields are available for cultivation at one time. This is due to the seasonal distribution of water. The rainy season in the moun-

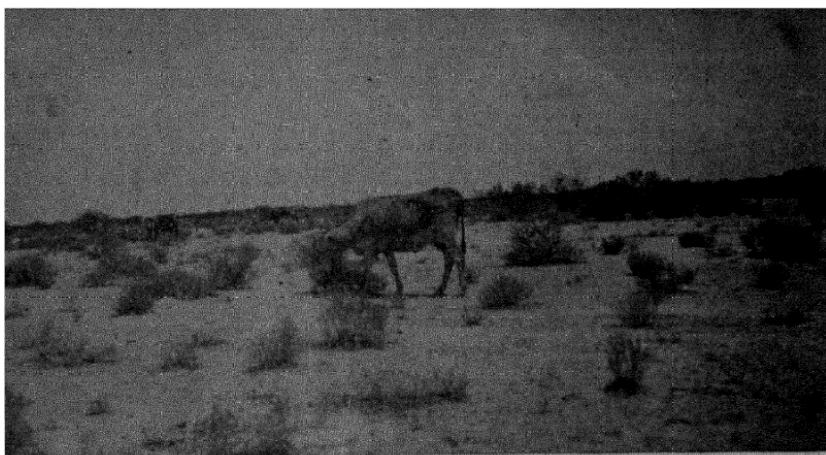


FIG. 37.—Unirrigated land in the Laguna basin, almost a desert, poor pasture land for livestock. Near the southern end of the Tlahualilo property.

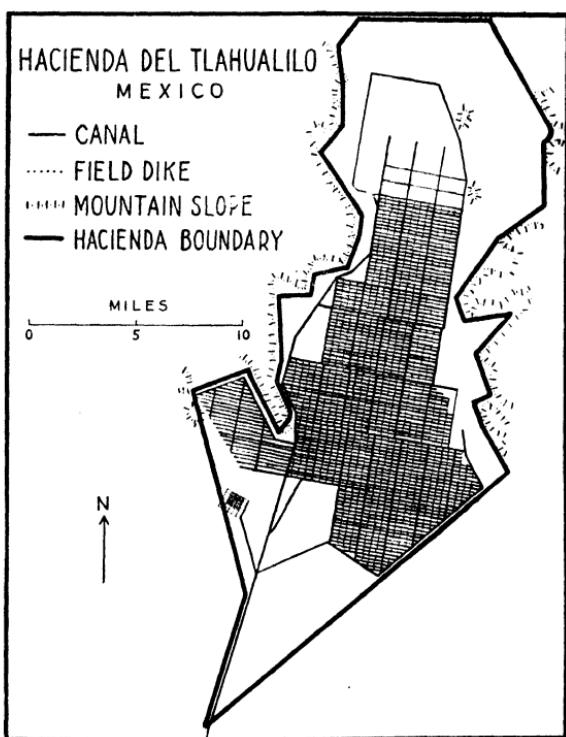


FIG. 38.—Fields and irrigation lines of Hacienda Tlahualilo.

taos is sharply defined, in the late summer. Runoff is rapid, and there are no large storage reservoirs either in the mountains or on the plain. Consequently, the water must be applied directly to the fields when it arrives. The regular time of arrival is in the late summer and autumn just at harvest time, too late to irrigate a growing crop and too early to flood fields

CROPS. On each rancho, half the fields are flooded about three feet deep between August and November. By December the water has soaked in, and by February the soil is dry enough for plowing and harrowing. In March and April, crops are planted. Cotton is the preeminent crop (Fig. 89). No other plant is so suitable, considering the amount of moisture available, the

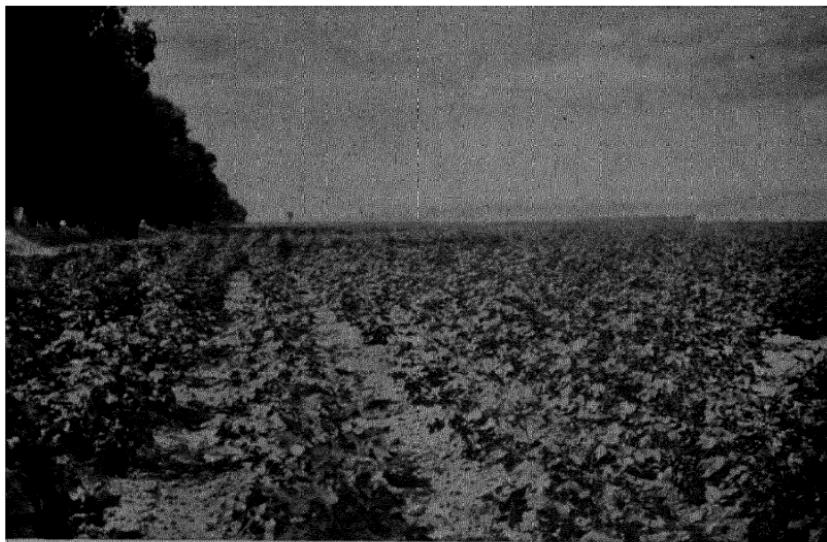


FIG. 89.—A cotton field in Hacienda Tlahualilo. Canal dike and poplar trees along the field border at the left. Mountain range bordering the property in the distance on the right. View looking north.

occupied by a maturing crop. Therefore, there must be empty fields ready to receive it. Thus fields that have lain fallow are flooded and practically become storage reservoirs of enough moisture to grow their crops the following season, while the harvest fields, which are not flooded, lie fallow in their turn. With minor crop exceptions, the system requires twice as much land as can be productive at one time. But because land is plentiful as compared with water, this is not a serious handicap; in fact, it is of some value for soil conservation.

character of the growing season, frost-free from March to November, and the marketable commercial product. It occupied 18,000 acres, when surveyed, almost 90 per cent of the cropland.

Wheat is a desirable supplementary crop, planted after cotton harvest in early winter, maturing before irrigation flooding the following summer, thus using labor at slack times and occupying fields that otherwise would be left idle and in addition providing a marketable product. Unfortunately, it requires irrigation in January when only a small and uncertain amount of

water is available, after the annual flood has subsided. It occupies less than 10 per cent of the land, 2,000 acres.

Fodder is needed for the work animals of the plantation, and some fields are given over to produce part of the supply. Sorghum fits in well under the circumstances; alfalfa fits less well, requiring more regular irrigation through the year than is generally possible.

Thus an average crop distribution in one rancho would be as follows: 1,800 acres of cotton in 60 fields, 1,500 acres of fallow land in 50 fields, 300 acres of wheat in 10 fields, and 240 acres of forage in 8 fields.

**SETTLEMENTS.** The activities of each rancho focus in a village, presided over by an administrator under whom are 10 foremen, each bossing a gang of 10 field laborers. The village contains houses for the laborers and their families, stables for the mules, sheds for farm implements, stacks of fodder, a reservoir for domestic water supply, a school, and tramline connection with the outside world of the plantation.

At cotton-picking time the working force is augmented by women and children and floating labor to about four hundred on each rancho. Pickers transport their bags of cotton by

donkey from the fields to the rancho village, where it is credited to them and whence it is carried by tram to the ginnery at the general headquarters of the plantation.

The headquarters town is the central focus for the whole hacienda. In it is the manager with his staff of assistants, engineers, chemist, entomologist, meteorologist, doctor, school superintendent, clerks, and skilled workers, to man the offices, ginnery and compress, oil mill, machine shops, powerhouse, waterworks, hospital, and school. There are also clubhouses, playgrounds, a theater, a post office, stores, a garrison of soldiers, and the terminus of a railway connecting the plantation with the outside world of Mexico (Fig. 36).

Tlahualilo is unique and not typical of the Laguna District in size and organization. Most of the properties have less than one thousand acres of irrigated land, and the few others that have large acreage are not operated as units but are divided among tenant farmers. Since these observations were made, expropriation of large properties and water rights to make small farms has progressed far in the Laguna District; small units are almost universal. But in agricultural practice Tlahualilo affords a good example of the utilization of natural resources in the region.

## 5. EL VERDE<sup>1</sup>

### A FARM IN THE PACIFIC COASTAL LOWLANDS

El Verde Farm is on the Tropic of Cancer, 30 miles inland from the Gulf of California among hills of the coastal lowland at an elevation of 200 feet above the sea [Fig. 9(5)].

The farm is part of an old hacienda of several hundred acres, including 70 irrigable acres in the valley of a small river. A few years ago the irrigable area was expropriated by the government and divided among the heads of families in the community.

<sup>1</sup> Field work in February, 1936.

Montalvo, who formerly worked as a laborer on the hacienda, received 7½ acres as his share and for this pays a small annual rent to the government. In addition to this land of fertile brown silt in the valley flood plain he owns 5 acres of sandy silt on the adjacent valley terrace (Fig. 40).

**WINTER FARMING.** The climate is characterized by a hot rainy summer and a warm dry winter. During the rainy season the bottom land is flooded

and not available for agriculture. During the dry season the stream shrinks to small proportions in a channel at some distance from the farm. No canal system for irrigation has been constructed, and probably none would be justified by the available stream flow. But there is a supply of ground water within ten feet of the surface under the flood plain, and this is tapped by

larger fields or beds, and tomatoes, lettuce, cabbage, and chili peppers occupy small beds (Fig. 42).

All these are valuable commercial crops, transported to Mazatlán by the truck of a commission merchant. The tobacco goes to a cigarette factory in Mazatlán for ultimate consumption in Mexico. The corn likewise is for the domestic market. The truck crops are

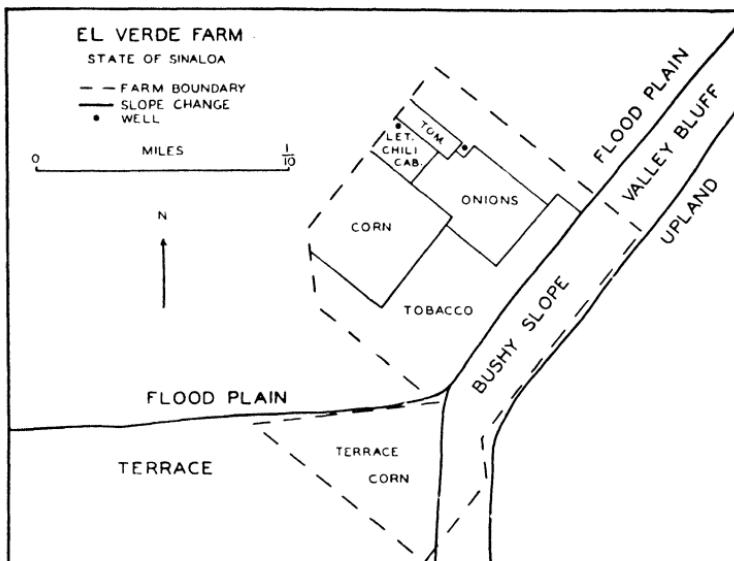


FIG. 40. - One of a number of small farm units made by expropriation of hacienda land. Abbreviations on the map are for truck crops: tomatoes, lettuce, and cabbage.

This and some of the other field sketches of small farms, sketched without reference to cadastral surveys, may show too many straight lines and right angles without following minor irregularities of actual form.

shallow wells and becomes the key to the principal agricultural activity.

A system of graded irrigation ditches extends from the wells to the furrows of the fields. Aided by a weighted well sweep a man can bring buckets of water to the surface and empty them fast enough to keep a stream of water flowing through one or another of the ditches (Fig. 41).

The winter growing season is from December to March. Tobacco, onions, and corn are three crops occupying the

for the high-grade winter market, and some of them at least are carried northward by refrigerator cars to the United States.

**SUMMER FARMING.** The terrace land lies fallow during the dry season, being too high to be economically watered from wells. During the rainy season, it produces a crop of corn without irrigation.

The upland outside of the valley is characterized by leached residual soil and is unattractive to agriculture at



FIG. 41.—Farm laborer drawing water from a flood-plain well and pouring it into the upper end of an irrigation ditch leading to fields, El Verde Farm.



FIG. 42.—Irrigation ditch between El Verde valley fields of lettuce and onions. Corn beyond and wooded upland in the background. The surface of the unirrigated terrace, only a few feet higher than the flood plain, is not visible, though its margin is marked by small trees just beyond the flood-plain cornfield. View looking southwest.

**any season.** In the countryside near by a few spots are occupied by the agave from which tequila is made, and the district has a reputation for production of this distilled beverage. But few plantings are required, and most of the area is left in bush vegetation, brown and dry through one part of the year, green and luxuriant through the other, used somewhat for the grazing of scrub cattle and goats, and for woodcutting.

Downstream a few miles the little valley of El Verde empties into a larger river valley, and here the stream flow is used in a system of canals irrigating the fields of several major

agricultural establishments—one of them a sugar plantation with a modern central mill, and others devoted to cotton production. These are better known than other features of the area, but presumably the little farm of El Verde is just as characteristic of the district.

The people of El Verde are of mestizo blood. Their settlement of the area is by no means new. Yet apparently it is not a settlement like those of the Central Plateau established in pre-Columbian times, but a settlement of Spanish Colonial times advancing from the Central Plateau to this lowland of the Pacific coast.

## 6. MEJIA<sup>1</sup>

### A FARM IN BAJA CALIFORNIA

Rancho Mejia is on the Pacific coast of the peninsula of Baja California, 40 miles south of the United States border [Fig. 9(6)]. The property has an area of about 125 acres, bounded by mountain heights on the east and seashore on the west. Between these limits it includes precipitous mountain slopes, topped by massive and schistose crystalline rocks; remnants of a high sloping terrace, bounded at its lower edge by a hundred-foot bluff; and a section of low terrace bounded by a fifty-foot sea cliff. A ravine, containing a small perennial stream, cuts across the terraces from mountain to sea (Fig. 43).

The slopes are barely covered by xerophytic vegetation—bushes, agaves, small cacti, bits of grass, and other herbaceous plants, green at the end of winter rains, brown during the long dry summer season.

**DRY FARMING.** About one-fifth of the property, 25 acres, is cultivable land. This includes a major part of the low terrace and a patch of land on the high terrace. The soil is dark brown silt, apparently derived from the dark

rocks of the mountain slope. In the low terrace there is a conspicuous admixture of white shells.

Until recently, agriculture was carried on in desultory fashion by dry farming. Beans and corn were planted in the latter part of the cool moist winter and ripened in summer with little or no additional moisture, except that of occasional summer fogs. This is still the case in the small field on the high terrace, used only for beans. Fall-sown wheat and barley also are grown without irrigation on a few farms in the vicinity, and these seem better suited than corn to the climate of summer drought. But for all these crops the yield is poor both in amount and in dependability, and costs of production are hardly repaid.

**IRRIGATING.** Recently a new tenant has undertaken to irrigate fields on the low terrace with water from the perennial stream in the ravine. A small gasoline-powered pump has been installed at the foot of the mountain, and water is pumped through a pipe line to the fields. The first crops to be grown are potatoes in a field of 3 acres

<sup>1</sup> Field work in March, 1936, and March, 1939.

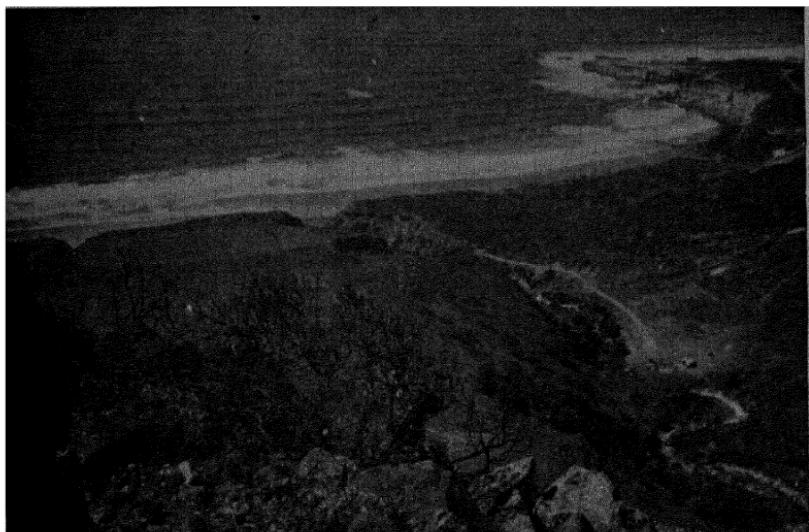


FIG. 43.—Rancho Mejia. View from the mountain slope, looking northwest. Farmhouse in lower right, beside the watercourse, reached by a lane. Pasture land and small dry fields on the high dissected terrace. Irrigable fields on the low terrace near the sea cliff.

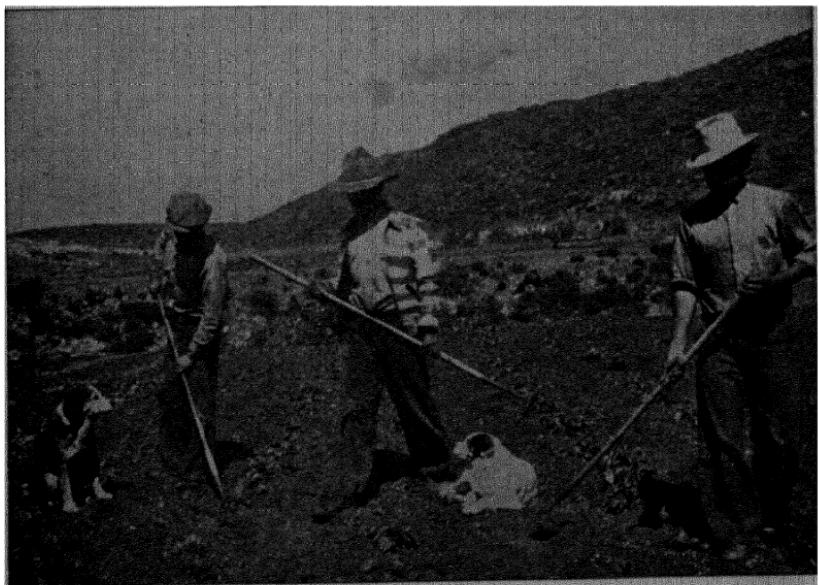


FIG. 44.—Farmer and assisting neighbors cultivating beans on the low terrace, Rancho Mejia.

and beans in a field of 5 acres. These are planted in February or March and start growing under winter rains before the use of irrigation. Cultivation is intensive, and the farmer is assisted occasionally by two neighbors (Fig. 44).

Tomatoes and other vegetables are to be added in other years. A good market for these early fresh truck crops is found in the town of Tia Juana at the United States border.

Livestock on the farm includes two horses for plowing and hauiling, two cows, a few pigs and chickens, and one goat. All these forage successfully in the ravine and on the slopes. The farmhouse is beside the ravine on the

low terrace and is of rough stone with a tar-paper roof.

The farmer and his wife are young people of mestizo stock who have come from a community of irrigation farming farther south in the peninsula. The owner, from whom they rent the property, lives in Tia Juana.

FISHING is another interest of some people along the coast, and there is a large fish cannery a few miles to the south. A farmer on the open shore without harbor or boat can hardly engage in fishing as a regular part of his work. But abalones can be gathered on the shore, particularly after a storm, and fish provide at least a part of subsistence needs.

## 7. CHICHÍ<sup>1</sup>

### AN HACIENDA IN YUCATÁN

Hacienda Chichí is in the heart of Yucatán, eight miles northeast of Mérida [Fig. 9(7)]. The region is a plain unbroken by major irregularities. The lack of hills and valleys over a great area is emphasized by the fact that a low range 50 miles to the south is known as "la sierra" and the lagoon along the coast to the north is known as "el río." But minor irregularities are innumerable. Hillocks and hollows of pitted limestone form a surface that is described by pedestrians not as flat but as very rough.

The impression of detailed roughness is increased by the vegetation cover, thorny scrub woodland, a jungle in the sense of tangled thicket with no implication of tropical luxuriance (Fig. 45). Xerophytic conditions prevail through a long dry season; and so rapid is the limestone underdrainage that even in the wet season of 4 months, when most of the yearly precipitation of 30 inches is received, the vegetation is not marked by luxuriance.

**PROPERTY.** In this subhumid rugged plain, Hacienda Chichí appears as

a big clearing surrounded by woods (Figs. 45 and 46). The property has an area of 4,741 acres and is irregular in form, outlined by metes and bounds with short spans between landmarks.

The present size and shape have been attained by accretion in modern times. The Colonial hacienda had less than 1,000 acres, a nucleus to which 15 pieces of adjacent property have been annexed, some of them haciendas in themselves.

The central group of buildings in Chichí is a monument to the people of that smaller Colonial establishment (Fig. 47). In the *casa grande*, with its arched cloisters and vaulted chapel, the responsive medium of Yucatán limestone has taken and preserved art forms of Spain as readily as it has elsewhere those of Mayan culture. There are no Mayan ruins to be seen in the hacienda, but there are some not far away and presumably the land was inhabited before the conquest by ancestors of the Indians who now work in the hacienda. Perhaps there was no greater gap between the Mayan com-

<sup>1</sup> Field work in January, 1933.

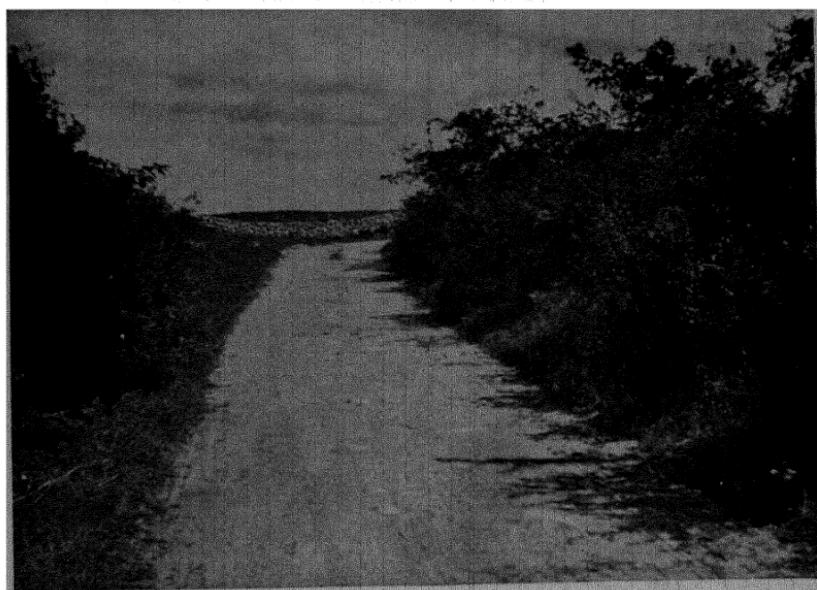


FIG. 45.—Main road through the woods at the point of entering the clearing of Hacienda Chichi. View looking east.

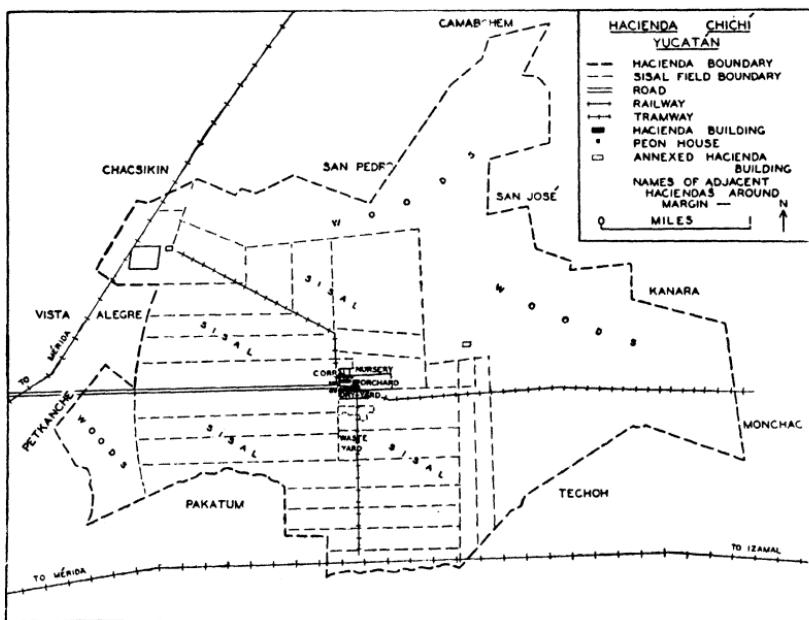


FIG. 46.—Land use in an hacienda producing henequen.

munity and the hacienda of Colonial times than between the Colonial hacienda, dependent on subsistence resources, and the modern commercialized establishment.

**HENEQUEN.** Enlargement by annexation has accompanied the development of a large-scale enterprise. The area of cleared land is occupied in large part by henequen, the sisal fiber crop indicative of commercial specialization.

hardly surpassed among tropical trade links of the present time (Fig. 10). Thus the hacienda, rich in laborers and acres but poor in soil for most tropical crops and tillage practices, has been converted readily by cultivation of the indigenous xerophytic perennial agave and has acquired more acres and laborers from unconverted neighbors.

The area of henequen in Chichí is 2,296 acres, 48 per cent of the property,



FIG. 47.—*Casa grande* terrace and facade, Hacienda Chichí. Teamcar on the track from fields to sisal mill, entering the headquarters area.

tion (Fig. 48). The modern hacienda depends, like its Colonial predecessors, on having soil and moisture enough for crops and Indian laborers accustomed to farming; it depends, also, unlike its predecessors, on having dry limestone land within the tropics, peculiarly fitted for the cultivation of henequen, and a location in a region easily accessible to the great middle-latitude sisal market. Yucatán has been called inaccessible, but the short and easy connection with the United States, by railway to Progreso pier and thence by boat across the Gulf, is

divided into 15 fields of 100 to 200 acres each. The fields are separated from each other and from the adjacent woods by broad lanes, occupying a total of 33 acres, for fire protection. The active acreage of henequen has actually been reduced to about 1,800 by the burning of fields and delay in replanting.

Because the land is uniformly and permanently suitable for the crop, the distribution of fields within the hacienda depends on convenience of location. The plantations form a continuous area already mentioned as a

large clearing, around the central group of buildings, reached by the branches of a tramline converging on the central establishment (Fig. 46). The old *casa grande* has been the point of attachment to which the modern transportation system has been tied and around which henequen has been planted. The importance of the focal point and its transportation system is based on two facts. (1) The raw product from the

a slow and protracted maturity, the harvest is continuous through the year, an advantage not enjoyed by many crops even in the tropics, allowing steady and efficient employment of laborers and equipment. All that is necessary is to cut the mature leaves, those lowest on the stem, often enough to ward off flowering and consequent dying of the plant before the end of its useful life span of about fifteen years.



FIG. 48.—Henequen fields to right and left of the main road, Hacienda Chichi. Trees and buildings of the headquarters area in the background. View looking east.

fields is a bulky commodity, amounting to a thousand tons a year, justifying tramlines and a predisposition for short hauls. (2) The bulk is 96 per cent waste matter that cannot be eliminated economically by portable machinery or on a very small scale, but can be separated easily at a stationary mill on a scale commensurate with the productive capacity of Chichi. The mill to which the tramlines lead is in an outbuilding of the central group.

The raw product consists of fleshy, fibrous leaves, three or four from each plant in the course of a year. Because the leaves grow perennially and reach

Because planting is infrequent and cultivating to keep down weeds is fairly simple, the chief operation is harvesting. There are about two hundred laborers. Men cut the leaves, and children (not counted in the labor force) pile them to be bundled and hauled in tramcars drawn by mules to the mill. From the mill the washed fiber is moved in cars to near-by drying yards and hung on wires to bleach in the sun for 24 hours. The much greater quantity of pulp is spread in near-by fields as fertilizer.

Beyond this point at which surplus bulk has been eliminated the

fiber product has less need of cheap transportation facilities. Nevertheless, incidental facilities are at hand. A standard-gauge railway en route to Mérida skirts the south side of the property near the end of a tramway branch (Fig. 46); and a narrow-gauge railway skirts the west side, also reaching Mérida to the southwest and extending northward to the port of Progreso. The product moves easily to the market.

**OTHER LAND USE.** Other parts of the hacienda are subsidiary to the main commercial interest. Yet they are, in a way, independent of it and hark back to the days before commercialization. The two conspicuous subsidiary uses of land typify the old disparity between landowner and laborers. For the owner there are nearly a hundred acres of gardens and orchards adjoining the *casa grande*. The shallow soil has been deepened by loads hauled from outlying areas. For particular trees the rock surface has been broken by blasting. The rainfall is supplemented by irrigation water pumped from a sinkhole containing water, a *cenote*, and distributed through an old masonry system of miniature aqueducts. Possibly this *cenote* prescribed originally the site of the *casa grande* and so is implicated in the present pattern of the hacienda.

The orchards contain orange, peach, avocado, banana, papaya, and sapote trees. The gardens contain cabbage, eggplant, beans, melons and other vegetables, and there are 215 beehives. Some fruits and honey are sold in Mérida, but for the most part the orchards and gardens are luxuries, for the enjoyment of the owner and his family. The gentlefolk come to the hacienda as a place of recreation in the country, residing most of the time at their house in the city. Active management of the hacienda is in the hands of a resident major-domo.

Grouped near the *casa grande* are 72 laborers' houses, similar and in rows, each with a small unirrigated sustenance garden and a few pigs and chickens. These form a contrast with the *casa grande*, but a more conspicuous antithesis in land use is that between the gardens of the *casa grande* and the woodland, monte, in outlying parts of the hacienda.

The area of the monte is 2,280 acres, 48 per cent of the hacienda. In its natural state it is of no use except as a source of firewood and as rough low-grade woodland pasture. But within the woods are numerous productive patches, irregular clearings in which corn is grown. These milpas represent the familiar agriculture of Indian laborers, supplying their staple food crop. A small area of woods is burned over before the first heavy rain near the end of the dry season. Corn is planted without tillage in holes in the ground where there is enough soil. After the rainy season, in November and December, the crop is harvested. The yield is about ten bushels per acre. After 3 years the site becomes unproductive and is left to revert to woods. A new clearing is made in another site. Thus an irregular sort of crop rotation is maintained over a period of years, and most of the wooded area has been used at one time or another or perhaps many times.

Hacienda Chichí is in the more populous and urbane part of Yucatán. An airplane view of the region shows numerous large clearings of henequen each with its central group of buildings; less numerous towns; and one city, a focus of railways (Fig. 10). Fifty miles to the south, in the vicinity of the little range of hills, "la sierra," on the fringe of the railway net, there is a fairly sudden transition, through a zone of milpas but no henequen plantations, into a region of luxuriant high forest without signs of human occupancy.



## Chapter III. Central America<sup>1</sup>

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Central America on a physical map looks like a connecting link between North and South America, but in reality it is an area of discontinuous occupancy and natural barriers. The land is divided among six countries and a European colony, although the whole area is less than one-third as large as Mexico and is less diversified by nature. Division in this case seems as intelligible as national unification in Mexico. Central America has no preeminent central nucleus surrounded by satellite districts. Instead, it has several smaller centers of population scattered along a strip of land. These populous districts form the nuclei of countries each of which has, on a small scale within itself, unity like that of Mexico (Fig. 49).

**FORM OF THE COUNTRIES.** The Central American countries exemplify generalizations made in Chap. I: small populous areas far from large centers form the cores of small countries. Most of them contain also still smaller centers as provincial districts and tracts of unoccupied territory as outlying borderlands. Most of them fail to conform to natural regions, contain parts of several regions, display striking variety of natural environment, and have boundaries cutting across sparsely populated areas.

In harmony with the political dissection of Central America, the surface transportation pattern (Fig. 50) is divided into separate systems each of which has some resemblance to that of Mexico: in each country a focus of transportation in the center of population with its own railway or highway outlets to the sea; some outlying productive districts with separate outlets to the sea. Between separate systems, overland connections are lacking, and most of the international boundaries are uncrossed

<sup>1</sup> The name "Central America" is used to designate the mainland between, and exclusive of, Mexico and Colombia. The term "Middle America" to designate a larger area (including Central America, part or all of Mexico, the West Indies sometimes but not always, and Colombia and Venezuela sometimes but not always) has not been needed and is not used in these studies. The term "Caribbean America" (to include Central America, Mexico, the West Indies, and Colombia and Venezuela) probably is less ambiguous but has not been found essential for designating a major division of these Latin-American studies.

by effective routes. Until recently, no two Central American capitals were connected by rail, and even now there is only one such connection.<sup>1</sup>

Which is cause and which effect as between political and transportational disunity? A broken pattern of land transportation preceded the

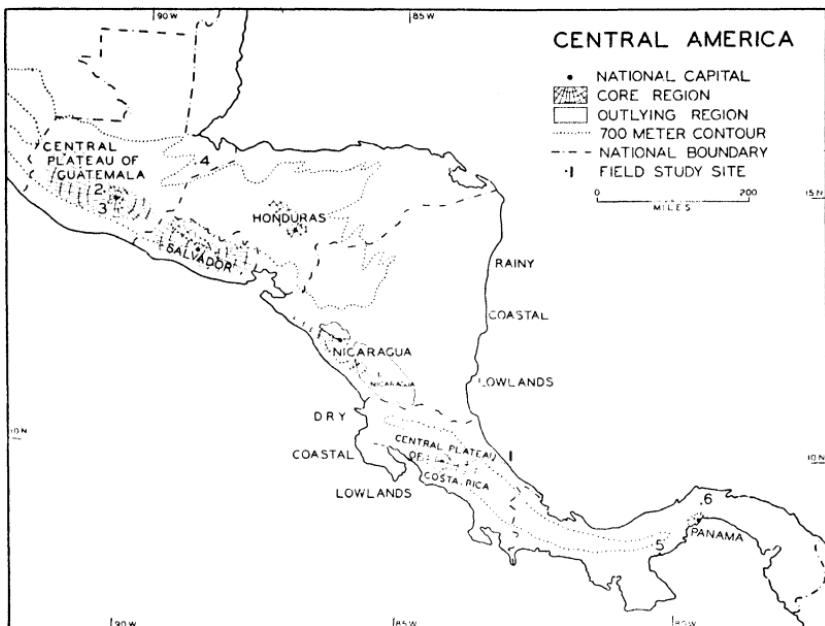


FIG. 49. By definition the "core" is the one region in each country containing the national capital. In every case the core region is a center of national life and contains a large and influential population. But the region containing the capital does not in every case dominate the country in all respects. Some countries have other regions not containing the capital (and therefore defined as "outlying" for cartographic convenience) that are more productive commercially than the core. In fact, the rise of new outlying regions to commercial importance exceeding that of old established political centers is a normal phenomenon. The Caribbean lowland region of Honduras is an example. A few countries have outlying regions more populous than the national core, though this phenomenon is less common, under usual conditions of population and political structure. The Pacific lowland region of southwestern Panamá is an example.

The field-study sites are numbered as usual in the order of discussion. Number 1 is shown at the end of a dash line indicating the traverse across Costa Rica. The traverse from end to end of Central America is not indicated here but is on Fig. 62. The succeeding studies are arranged in a regional progression: high highlands, low highlands, Caribbean lowlands, Pacific lowlands, and interior uplands.

political division into independent countries and has been based always on the advantages of sea over land for easy transportation, with consequent preference for short cuts to the sea instead of land routes paralleling the shore. Broken land transportation is at least a secondary cause of

<sup>1</sup> San Salvador with Guatemala City.

political disunity. On the other hand, political disunity has been a secondary cause of transportational disunity, still existing on the surface, though not in the air. Neither transportation nor political division has been a primary cause; both rest on more fundamental elements of division in Central America.

**NATURAL REGIONS.** Three major natural regions extend through the length of Central America: a strip of the western highlands, coastal low-

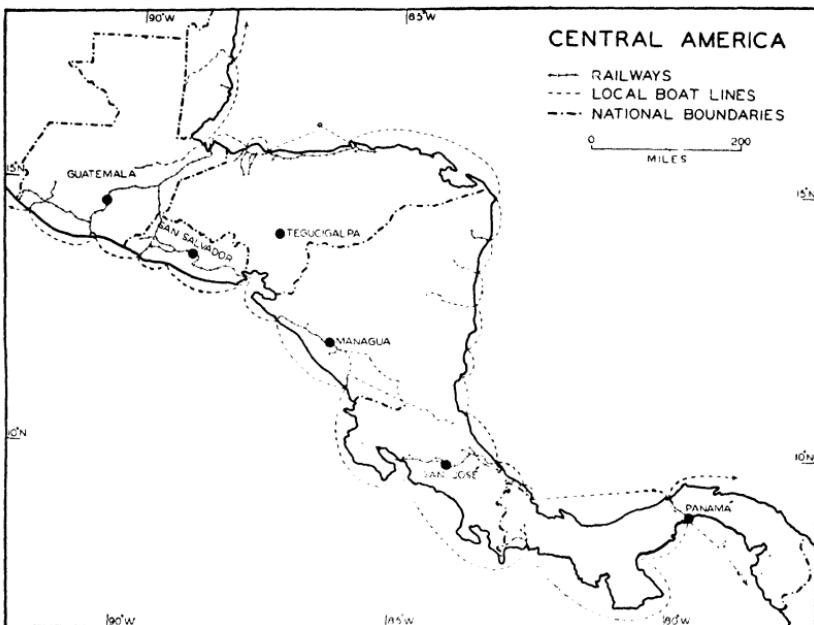


FIG. 50.—Local transportation lines in each country form a national system connecting outlying areas with the capital. Tegucigalpa, capital of Honduras, has no railway but is connected by motor road with the Pacific and Caribbean coasts. External connections by sea and air (and by land with Mexico) are shown on continental maps (Figs. 502, p. 530, and 503, p. 531).

lands bordering the Caribbean, and coastal lowlands bordering the Pacific (Fig. 3, page 11). Within these regions, intensive local variety is more noteworthy than extensive homogeneity. The highland belt in particular is marked by an intermixture of extremely habitable and almost uninhabitable districts. It is significant that several of the Central American centers of population occupy areas of recent volcanic activity, smaller than the Central Plateau of Mexico but having similarities of form, soil, and altitude.

The coastal lowlands, tropical in climate, rainy on the Caribbean side, and seasonally dry on the Pacific (Fig. 4, page 12), lack such

especially habitable areas as there are in the highlands; and different parts of these coastal borderlands are distinguished from each other primarily by their proximity to different highland centers, to which they are politically attached. Accordingly, several of the countries contain, like Mexico, a populous highland district, sparsely populated outlying highland districts, and sections of lowland on both Atlantic and Pacific sides. The individual countries, thus formed of somewhat similar slices of three regions, are somewhat alike. At the same time, each country is unique and deserves separate characterization.

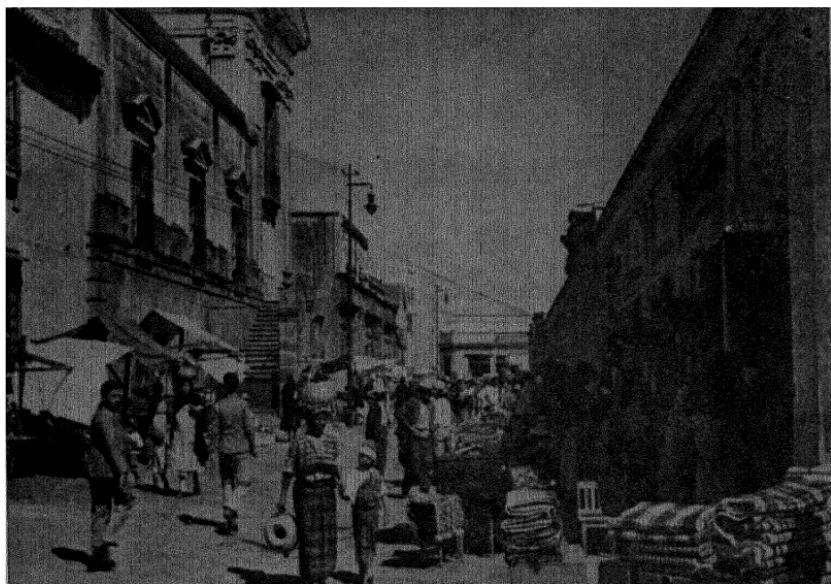


FIG. 51.—Guatemala City. A street of the central market, where both Indian and foreign trade goods are sold. Altitude 4,900 feet. January, 1933.

### The Individual Countries

Central America begins arbitrarily where Mexico leaves off—that is, at the limit of modern political control from the Central Plateau. One or two of the southern states of Mexico might be northern countries of Central America were they not within active reach of the Mexican plateau. Beyond the Mexican border the first units are Guatemala and British Honduras.

GUATEMALA is like other countries in having a populous volcanic zone and outlying sparsely populated highlands and coastal lowlands (Fig. 49). It is distinctive in having a larger and higher plateau (Fig. 4, page 12).

a larger population (Fig. 8, page 16), a larger proportion of Indian population, and a larger city (Fig. 51) than any other Central American country. These facts fit together consistently: the larger plateau supports more people; the higher altitude places much of the area above the line of occasional frost in the *tierra fría*, allowing for the subsistence agriculture of highland Indians, as in the Mexican Plateau, and not for commercialized tropical agriculture, as at lower altitudes. Guatemala has, in addition, lower areas and does not lack tropical production in low highlands and outlying lowland districts. Accordingly, although the per capita foreign

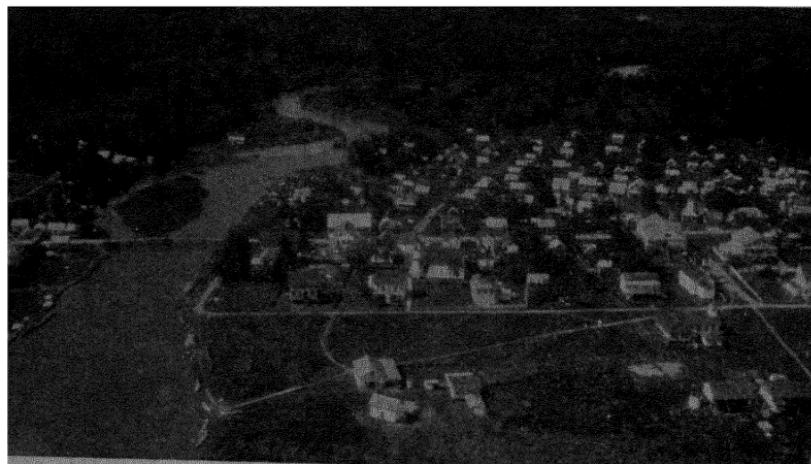


FIG. 52.—Stann Creek, British Honduras, at a river mouth (North Stann Creek). The stream itself forms a poor harbor and is navigable only for skiffs, but 2 miles down the coast is a landing place for ocean-going ships. The district has more development of farming and less of forest interests than other sections of British Honduras. The town has a citrus-fruit packing plant, a cassava starch factory, a school, and a hospital. Air view, looking west, January, 1933.

trade of Guatemala is less than that of any other Central American country, the total amount of this trade is greater than that of most others.

BRITISH HONDURAS shares with Guatemala a transverse slice of Central America adjacent to Mexico (Fig. 49). The lion's share of the slice belongs to Guatemala, including highlands, lowlands, and frontage on both oceans. The British share is only a poorly developed strip along the Caribbean coast.

Why does not Britain have the lion's share? This question is equivalent to asking: Why in the tangled sequence of events has the British Empire gone so far and no farther in occupying a bit of Central America and other corners of the world? This is no place for an answer. It can

only be noted that in Central America a balance has been struck between a secondary interest of the distant British commercial sea power and primary and secondary interests of the near-by Guatemalan plateau power, a balance still trembling in the suspense of a territorial dispute.

Statistically, British Honduras appears unique among the countries of Central America, not only in its colonial status but also in its land and people: it has the blackest and sparsest population, the smallest foreign trade, the greatest per capita foreign trade, the largest proportion of nonagricultural products among exports, and the largest proportion of food products among imports. Actually, it is not very different from some

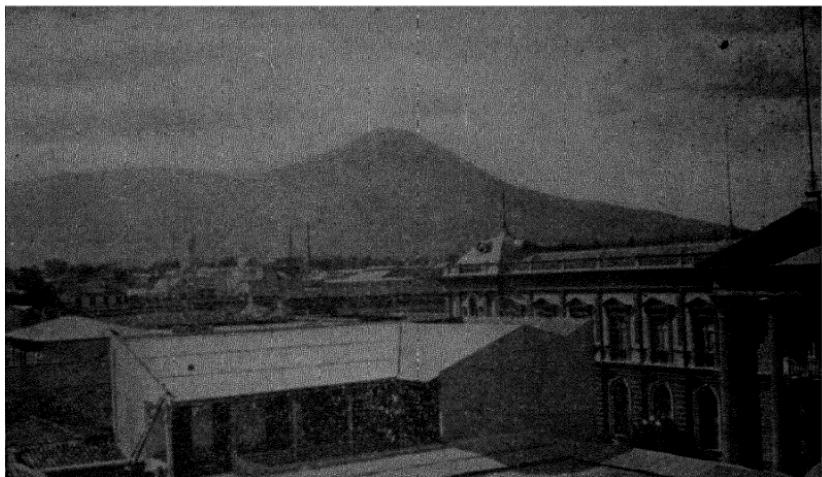


FIG. 58.—San Salvador, capital of El Salvador. Altitude 2,100 feet. View looking northwest, toward the volcano San Salvador, February, 1922.

other parts of the Caribbean lowlands of Central America, except in the fact that it is politically detached from highland districts and therefore statistically detached in average characteristics. Other parts of the Caribbean lowlands are similar to British Honduras in being sparsely populated, settled by Negroes from the West Indies, and organized in a few forest enterprises and plantations for production of specialized commercial products, not for subsistence agriculture (Fig. 52).

That British Honduras is the only part of the Caribbean lowlands detached politically from adjacent highlands is a fact having a natural setting: the forest resources of this part of the coast were more plentiful and more accessible for British exploitation; it was exceptionally far off from any populous highland district and aloof from highland contacts. In view of these circumstances, its exceptional political status, though not inevitable, is in accordance with reasonable expectation.

**EL SALVADOR**, adjoining Guatemala on the southeast, also is peculiar statistically among Central American countries, in average characteristics: it is the most densely populated, almost four times as densely as Guatemala; and it has a larger proportion of its trade with Europe than the other countries have. These facts reflect national simplicity rather than regional peculiarity. El Salvador consists of a populous volcanic highland district without sparsely populated appendages. This plateau area is similar in various ways to the central district of Guatemala, including similar density of population (Figs. 8, page 16, and 53). Lying below the altitude of frost in the *tierra templada*, like lower parts of the Guatemalan plateau, it produces coffee for the European market as well as food for home supply but has no outlying Caribbean district to dilute its average density of population and to produce bananas for American trade.

Though not distinctive in its regional characteristics, the low plateau of El Salvador is peculiar in its relations in that so populous a district has no outlying territory attached to it politically, to affect average figures. The contrast in average density of population is great with respect to Guatemala, but still greater with respect to El Salvador's other neighbor, Honduras, in which the average density is only one-seventh as great (Fig. 8, page 16).

HONDURAS partly encloses El Salvador, and the two countries together seem to share a transverse slice across Central America (Fig. 49), in the same way as Guatemala and British Honduras. In the case of El Salvador and Honduras, there may be doubt as to which is the lion or as to whether the lion has his share. El Salvador has a larger population but a smaller area and is confined to the Pacific side. Honduras has a smaller population but holds a larger area and has highlands, lowlands, and frontage on both oceans.

This is an exception to the generalization that larger centers of population form the nuclei of larger countries and smaller centers the nuclei of smaller countries. There is no great contrast between the people of El Salvador and Honduras as a reason for the exception; in both centers the population is mainly mestizo of Spanish and Indian stock. In accounting for the exception a relevant fact is that the highlands of Honduras have been the leading area of mineral production in Central America and that in the Spanish Colonial period, when nations were taking form, mines of precious metals were more important than fertile farms.

Whatever may be the historic causes of territorial distribution, Honduras, with its old eroded highlands and forested lowlands along an extensive Caribbean coast, has had a low density of population and slow progress toward internal development (Fig. 54).

In the future, Honduras may again become important for more than bananas, small-scale mining, and subsistence farming, through develop-

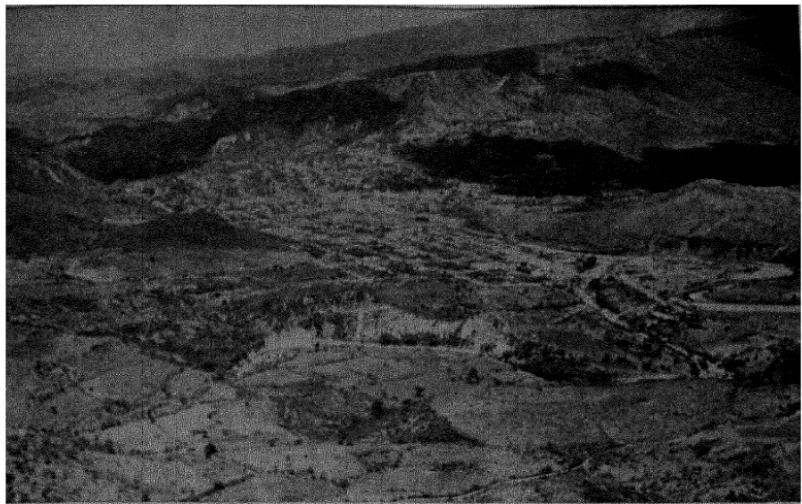


FIG. 54.—Tegucigalpa, capital of Honduras, a valley site among dry grassy hills. Pine woods on the low mountains in the background. Altitude of the city 8,500 feet. Air view looking northeast, February, 1936.

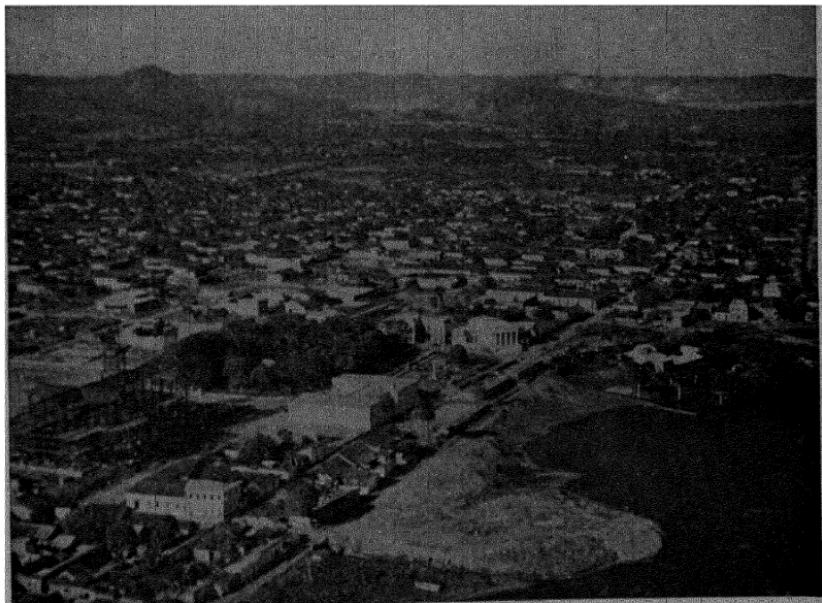


FIG. 55.—Managua, capital of Nicaragua, on the shore of Lake Managua. Rebuilt after earthquake destruction. Altitude of the city 150 feet. Air view looking west, January, 1933.

ment of potential but refractory resources—low-grade ores, tropical forests, and grazing lands, in a relatively extensive territory. But development need not be expected except in terms of the common probability that the wheel of fortune will turn, that tropical resources which have been hardly used will become more important than others which have been easily and quickly used, both in Central America and elsewhere.

NICARAGUA has as good a prospect as Honduras for future greatness in contrast with present mediocrity. It has a larger area, the largest of



FIG. 56.—San José, capital of Costa Rica, among farms and coffee plantations in the central plateau. Altitude of the city 3,800 feet. Air view looking southeast, February, 1936.

the Central American countries, in a complete transverse section from ocean to ocean (Fig. 49), containing both a volcanic district, of mestizo population and sedentary tropical agriculture, and outlying highlands and lowlands. The volcanic area is the heart of the country, even though it is a lowland plain and not a plateau (Fig. 55). This suggests advantages in volcanic surface and soil even without high altitude. The gap in the highland belt offers a low route across Central America, including Lake Nicaragua, a feature of the volcanic plain. This route was used for travel in Colonial times and is available now for a canal, if wanted (Fig. 3, page 69).

COSTA RICA occupies a narrower section of Central America (Fig. 49), yet in this small space has a volcanic central plateau, outlying highlands,

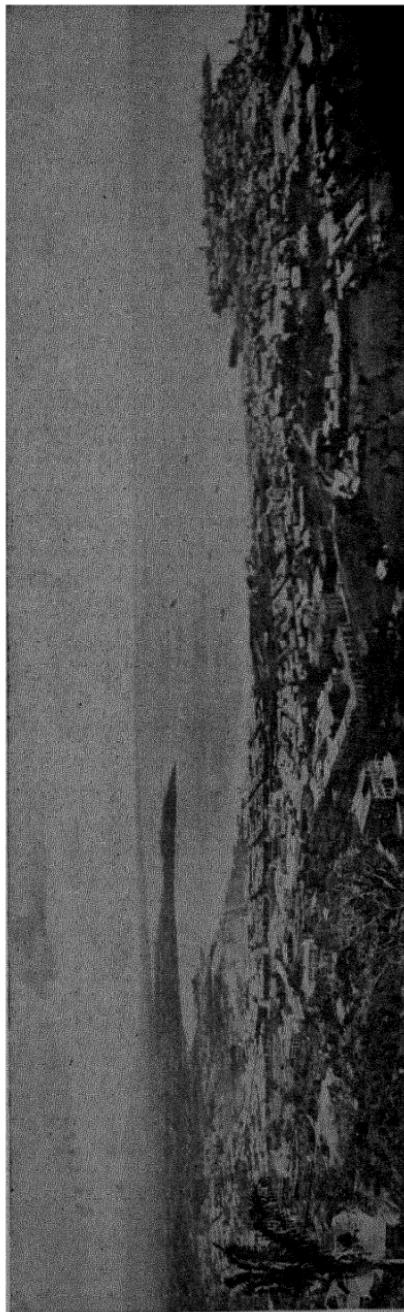


FIG. 57.—Panamá City, capital of Panamá, on the Pacific coast, from a hill in the Canal Zone. Large buildings in the foreground are in the Canal Zone, but the city itself and the land around the bay and in the distance are in Panamá. The old site of Panamá, sacked in 1671 and abandoned in favor of the present site, is at the head of the bay farther east. View looking southeast, February, 1922.

and Caribbean and Pacific coastal lowlands. The plateau is only a minor fraction of the area but contains a majority of the population and gives character to the nation (Fig. 56). Costa Rica is known as the whitest, the most democratic, and the most stable country in Central America. Its characteristics spring from the nature of the plateau, a simple, compact, isolated, productive district settled by Spanish farmers, far from the centers of sedentary Indian culture, and lacking a sedentary Indian population with an accompanying landholding aristocracy. In other respects, it is like other low volcanic plateau areas, having the frost-free climate of the *tierra templada* and producing coffee. The outlying districts are like corresponding parts of the other countries.

PANAMÁ is in population the smallest country of Latin America and is known as a crossing place rather than as a populous and productive nation (Fig. 49). This idea is justifiable, even though the Canal Zone is less than 2 per cent of the national area and is not controlled by the nation. The crossing place is the heart of the country and gives character to it, as the central plateau gives character to Costa Rica. It is not surprising that Panamá is the most cosmopolitan country of Central America, that its imports are much greater than its exports, that population and wealth are concentrated in a relatively unproductive district, and that it has the largest port city in Central America. The capital of Panamá (Fig. 57) and the other important city, Colón, are phenomena of the crossing place, so close to the Canal that they form enclaves in the Canal Zone excluded by explicit arrangement.

Unlike any other Central American country, Panamá has a volcanic area that is not the heart of the country but merely one of the outlying districts known for its fertility and recent exploitation. The crossing place supplies the distinctive reputation of Panamá. However, the outlying districts, highlands and lowlands, on the Caribbean and Pacific sides, containing many people in scattered communities, represent better than the Canal Zone various types of environment and occupancy characteristic of Central America from end to end.

### Field Studies

The following Central American field studies illustrate regional variety from place to place and do not show such variety between one country and another. In fact, they indicate contrasts within countries rather than between countries, and only minor differences of territorial structure to distinguish country from country.

*On Traverses.* Preliminary impressions of the three major regions of Central America appear in the traverse across Costa Rica [1(a)], following a line of developed transportation and productive occupancy

across the rainy Caribbean coastal lowlands, the volcanic central plateau, and the dry Pacific coastal lowlands.

The traverse from end to end of Central America [1(b)], crossing the Costa Rican traverse, provides an additional impression of contrasts in natural environment and occupancy within each of the major regions, particularly between one part of the highlands and another.

*In Highlands.* In the Central American highland region the only populated area of high highlands is the higher part of the Guatemalan plateau represented by the Sacatepéquez Farm (2). This district, touched by occasional frost, is to be compared with the Central Plateau of Mexico rather than with lower parts of Central America. Sacatepéquez is in a more dissected area than Magdalena Atlipac and has a different organization, but its Indian subsistence economy is similar. Other communities in the high highlands of Guatemala are more like Magdalena Atlipac in having smooth fertile land and a farm village organization.

Volcanic plateau areas of lower altitude are numerous and conspicuous in the Central American highlands. Miraflores is a coffee plantation in the *tierra templada* of Guatemala (3). Other districts are different, but the characteristics of productive land, intensive occupancy, coffee growing, and subsistence agriculture appear not only in the low highlands of Guatemala but also in the volcanic plateau centers of El Salvador and Costa Rica. There is even some coffee growing under similar circumstances in the other countries, although the highlands of Honduras are not volcanic and the volcanic lands of Nicaragua and western Panamá are in large part not highlands but low plains thought unfit for coffee.

*In Lowlands.* In the rainy Caribbean coastal lowlands of Central America the most prominent type of occupancy is that of banana plantations. Maya Farm is a representative unit (4). Banana plantations do not form a continuous strip along the coast, as is evident from this study, but are in districts separated by miles of nearly unoccupied rain forest. Though distributed in the various countries sharing the Caribbean coast from Mexico to Panamá, the districts are similar and associated in international trade organization, and one example serves as an illustration of all.

The Pacific coastal lowlands have some variety of occupancy, but in general the area is characterized by a long dry season, savannas and dry woodlands, livestock ranching and small farming, in outlying settled districts in all the countries from Mexico to Panamá. Common characteristics are represented in the study of Hacienda Constancia, Panamá (5).

Forested hill country is prevalent both in coastal lowlands and in low parts of the highland region. Calzada Larga, at a low pass in the continental divide, is one of many places where timber is cut, an example of minor exploitation in an outlying district of sparse occupancy (6).

**CENTRAL AMERICAN UNITY.** Evidently the field studies call attention to common regional characteristics rather than to differences between countries in Central America. The division into separate countries seems quite natural, under circumstances already outlined, but political disunity is not necessarily permanent. These small nations, close together and so similar as to have common interests and common problems, clearly need unity. Past efforts to achieve unity have failed for reasons that are neither perpetual nor insurmountable. Signs of the times point toward unification: the Pan American Railway project has been influential as an ideal, even though unrealized; Pan American Airways provides a real connection between all the capitals of Central America; the Inter American Highway is in process of realization; and the pressure of world events affects small nations. Unification may come within a generation.

## 1. CENTRAL AMERICAN TRAVERSE

### a. ACROSS COSTA RICA<sup>1</sup>

Costa Rica is one of the Central American countries that is crossed by a railway from ocean to ocean [Figs. 49(1) and 50].

**CARIBBEAN LOWLAND.** Limón is the terminus on the Caribbean side. Along the shore, north and south of the port, is the sweeping curve of a beach bordered by a fringe of coconut palms. Behind the beach is a coastal plain several miles wide. Several rivers cross the plain, and their valley lowlands form extensions of the plain back into the mountains.

The coastal region is hot and rainy throughout the year. Rain forest is the natural type of vegetation. Plants spring up in profusion wherever there is space to compete with each other for light. The edge of the forest is almost impenetrable, but within it the dense stand of tall trees and climbing vines shades the ground to such an extent that there is very little undergrowth and walking is easy (Fig. 58).

The aspect is not unlike that of hardwood forests of the United States in their primeval state.

This lowland is the seat of a great agricultural enterprise. Conditions are good for banana production, but the control of the natural vegetation is so difficult and problems of health and transportation are so great that individual settlers are helpless and the district remained a wilderness until a full-grown organization stepped in, ready to face all the problems at once. In recent years, the rain forest on the plains has been replaced by banana farms, with thousands of acres of tall, broad-leaved plants and with numerous groups of wooden buildings and a close network of railways (Fig. 59). On older land, bananas have declined on account of blight and have been succeeded by other crops, particularly cacao.<sup>2</sup>

Many inhabitants of the district are English-speaking Negroes, brought in

<sup>1</sup> Field Work in February, 1922. R. S. PLATT, A Cross Section of Central America in Costa Rica, *Journal of Geography*, Vol. 22 (1923), pp. 95-100.

<sup>2</sup> Report of a field study of farms in the Caribbean lowlands. MELVIN A. SHOUSE, "Lowland Hinterland of Limón, Costa Rica," University of Chicago M.S. Thesis, 1938.

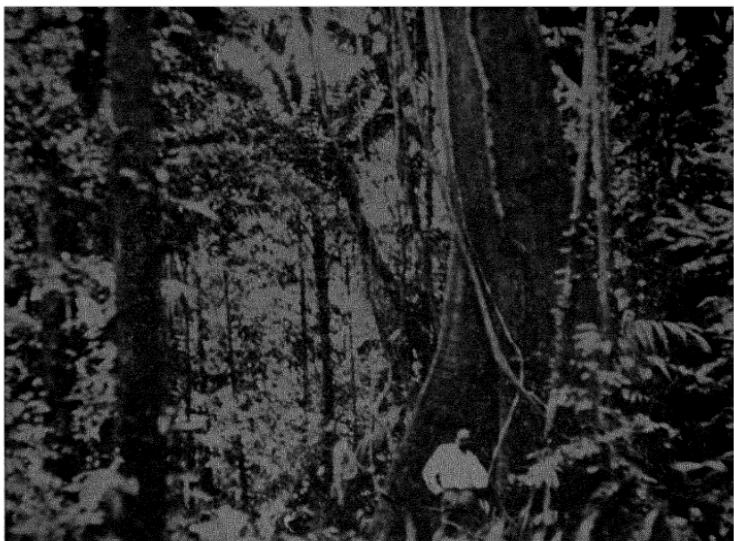


FIG. 58.—In rain forest (*selva*), on a slope of the Estrella Valley, Caribbean lowlands, Costa Rica.



FIG. 59.—Loading bananas at farms on the Estrella Valley main line, Caribbean lowlands of Costa Rica.

from the West Indies as laborers. White men from the United States act as overseers.

**CENTRAL PLATEAU.** West from the coastal plain the main railway line follows one of the river valleys up into the mountains. The river is swift, the valley is narrow, and the slopes are covered with dense rain forest.

After several hours of climbing the train reaches a more open upper valley

there are cement floors and tanks for the cleaning and drying of the coffee beans (Fig. 60). The farmhouses have plastered walls and tiled roofs, instead of wooden walls and zinc roofs as on the coastal plain. There are many small farms instead of large plantations, and the inhabitants are Spanish-speaking white people instead of English-speaking Negroes. In the midst of the valley is a beautiful white capital

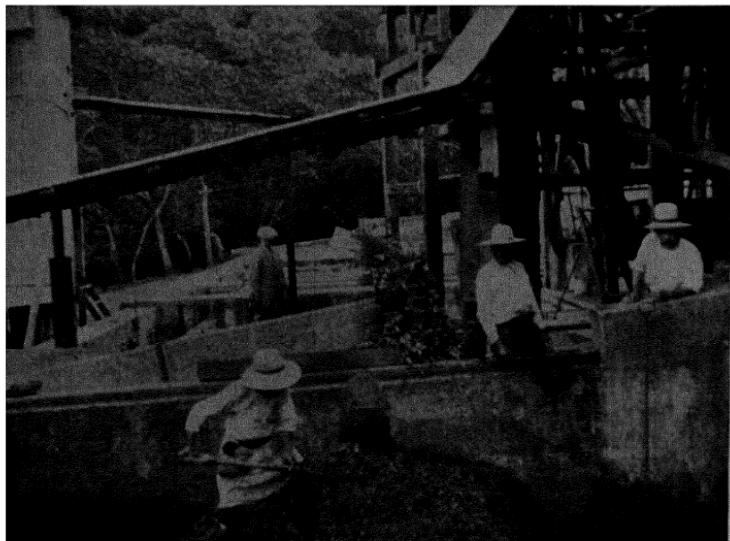


FIG. 60.—Shoveling coffee in the fermenting pit of a cleaning establishment, central plateau of Costa Rica. Coffee grove in the background.

and finally emerges on the floor of a broad basin. This is the plateau, an undulating upland, above which rise the smooth green slopes of cloud-capped volcanoes. There are scattered trees, pastures bordered by stone walls, fields of corn and potatoes that look much like those of New England in summer. The climate of the plateau is mild throughout the year, and there are dry and rainy seasons.

Coffee is the chief crop of the district. There are numerous groves, large and small, in which coffee bushes are grown in the shade of larger trees. Here and

city, San José (Fig. 56), and there are other substantial towns. The plateau district, of which San José is the metropolis, is a populous and productive area.

**PACIFIC LOWLAND.** The way to the west from the plateau is through a deep gorge down the banks of which the railway descends to the Pacific. In the descent the landscape changes to semi-arid country, hot and sparsely populated. The Pacific coast terminus of the railroad is Puntarenas, "sandy point." Along the coast, temperature is high throughout the year, and there are

a short rainy season and a long dry season. Mountain spurs reach to the coast in many places, and the coastal lowlands are narrow and interrupted.

The general aspect of the coast is like that of southern California. Thorn forest is the natural vegetation, a scrubby, tangled growth locally more difficult to penetrate than the rain forest of the Caribbean coast. In it there

Here there are ranchers and farmers, some of them old inhabitants and some newcomers.

The major physical features of Costa Rica extend throughout the length of Central America: rainy forested lowlands on the Caribbean side, dry slopes on the Pacific side, a central backbone of mountains, and high intermontane valleys or plateaus.

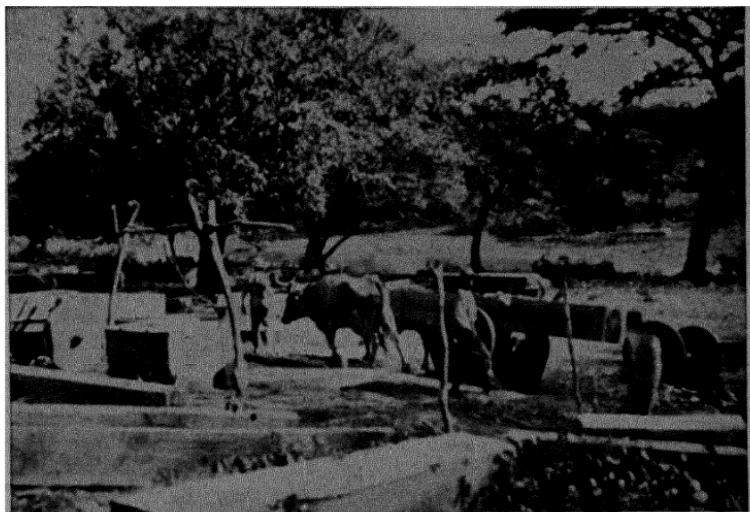


FIG. 61.—Hauling mahogany and other hardwood timbers to a shipping point on the Rio Tempisque, province of Guanacaste, Pacific lowlands of Costa Rica. Dry woodland in the background.

are some trees of commercial value, particularly log-wood and other sorts of dyewood. Back from the coast in some places there are moister valleys and rolling foothill lands, where the forests contain mahogany and cedar trees (Fig. 61). In such places, cleared land affords good pasture for cattle, and crops of corn and upland rice can be raised.

Political boundaries thus unite places that are very different in environment, and separate places that are very similar. This division is not due to political plans or to unaccountable accidents but is a normal development, in view of the localization of settlement in separate districts, such as the central plateau of Costa Rica.

#### *b. FROM END TO END OF CENTRAL AMERICA<sup>1</sup>*

An air traverse through the length of Central America from Mexico to Colombia seems to supplement the

land traverse across Costa Rica (Fig. 62). In this there is confirmation in a broad way of a general composite

<sup>1</sup> Field work in January, 1933. R. S. PLATT, An Air Traverse of Central America, *Annals of the Association of American Geographers*, Vol. 24 (1934), p. 29-39.

similarity through the whole traverse area as a part of a major region, Caribbean America, a tropical symphony of land and sea, of hot lowlands and cool highlands, of wet forest and dry

But such general concepts seem elementary and dim, of substance thinly spread, in the presence of the vivid landscape types appearing within and across the larger divisions.

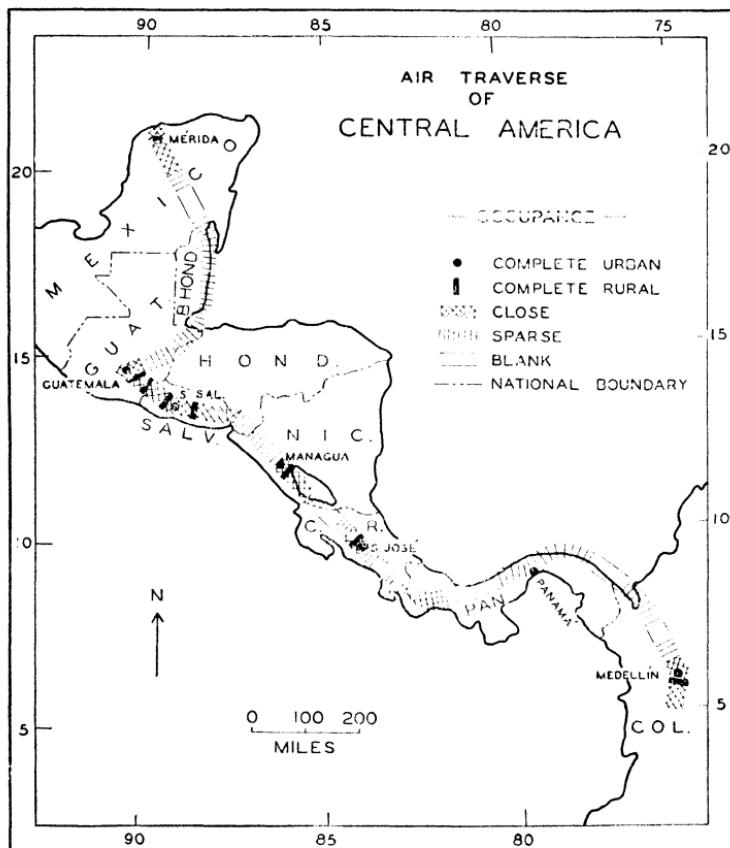


FIG. 62.—Intensity of occupancy along the air traverse route.

scrub, of populous communities scattered in a wilderness.

There is confirmation also in a broad way of certain larger subdivisions of this area: the moist forested lowlands of the Caribbean margin, the rugged highland backbone of Central America bordered by volcanoes in some places, and the narrow semiarid lowlands of the Pacific margin.

The variety is not chaotic but fits readily into a few types, distinguished primarily according to intensity of land occupancy. Four grades of occupancy emerge: at one extreme, complete occupancy where all the land is occupied to a point of visible improvement; at the other extreme, blank occupancy where none of the land is visibly occupied; between these, close

occupance where more than half the land and sparse occupance where less than half is occupied (Fig. 62).

**COMPLETE OCCUPANCE.** Of complete occupance, only small spots appear on the map. Many of these are cities—Guatemala (Fig. 51), San Salvador (Fig. 53), Managua (Fig. 55), San José (Fig. 56), Panamá (Fig. 57).

others are in pasture or fallow. Small houses are numerous, scattered or clustered among the fields here and there; large buildings are relatively few. Lanes between fields are numerous; highways and railways few.

In other respects, there are differences among the districts. The highest, in Guatemala, has fields of wheat or

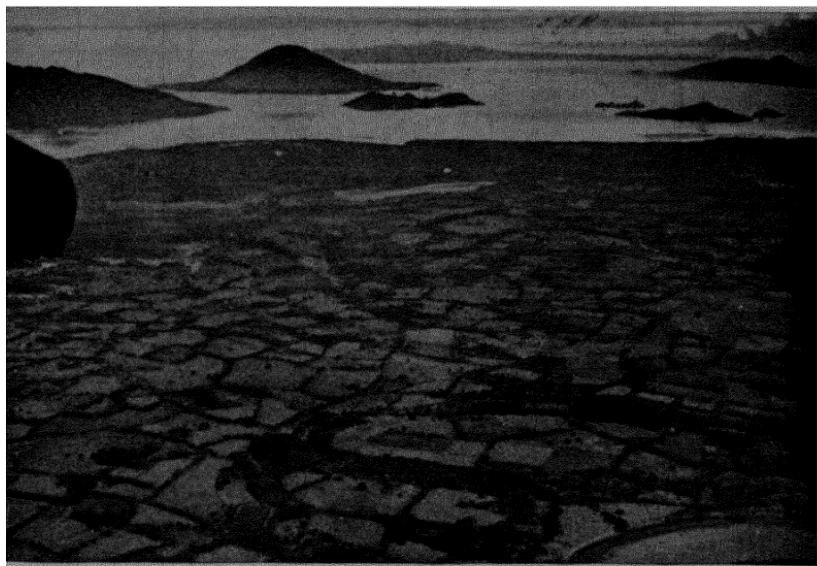


FIG. 63.—Complete occupance in a pattern of small fields, near the eastern end of El Salvador. Bay of Fonseca in the background. Islands and mainland of Honduras at the left. The area of complete occupance is small and is included in a larger area of close occupance in Fig. 62. Air view looking southeast.

Rural areas of this grade are confined to exceptionally uniform tracts of land in highly productive agricultural districts. These are in the higher plateau of Guatemala, the lower plateau of southeastern Guatemala and El Salvador, (Fig. 63), the lake-basin plain of Nicaragua, (Fig. 64), and the plateau of Costa Rica. In these districts, spots of smooth land are covered by a pattern of rectangular fields, fairly small, outlined by walls or bushes. In each district a considerable number of the fields are occupied by corn, and

other small grain, as well as corn, while the others have sugar cane, plantains, cassava and other root crops, and tropical fruits. The districts of medium elevation, in Guatemala, El Salvador, and Costa Rica have coffee groves among the open fields or grouped around drying floors and buildings. Costa Rica has fields of upland rice. The lowland area in Nicaragua has a higher proportion of pasture.

**CLOSE OCCUPANCE.** Areas of close occupance, more extensive than the spots of complete occupance, appear in

all the districts mentioned above and in some others (Fig. 62). Close occupancy in the plateau of southeastern Guatemala and El Salvador extends on into Honduras, declining in eleva-

crops. But the field pattern is irregularly broken, generally by steep and rocky slopes, canyon walls below or lava flows above, wooded in some cases, barren in others (Fig. 64).



FIG. 64.—Close occupancy on a volcanic island in Lake Nicaragua. Steam issuing from the cone. The opposite shore of the island visible beyond the cone. A village and closely spaced fields near the shore in the foreground; woods and scattered fields beyond. Air view looking southeast.

tion almost to the Pacific coast (Fig. 63). Another lowland district, similar but detached, appears on the Pacific slope of western Panamá. In all these areas the elements of the pattern are like those in the rural spots of complete occupancy—cornfields, pastures and small houses, and, in their respective districts, coffee and other special

**SPARSE OCCUPANCE.** Areas of sparse occupancy lie between and beyond those of close occupancy (Fig. 62). In some cases, they are fringes of the same pattern containing the same items as the more densely occupied areas near by. But in most places they are distinctive settlements of a different sort. Thus between the close occupancy

in the lake basin of Nicaragua and that on smooth slopes near the Honduran-Salvadorean boundary there is sparse occupance in the Honduran-Nicaraguan boundary zone—a predominance of dissected brush-covered hills, a few small groups of buildings with cattle corrals among the hills, and patches of corn, cane, and plantains along stream valleys.

settlement even by proximity. The coastal margin of British Honduras with a bit of Mexico to the north and Guatemala to the south appears as an area of sparse occupance distinct from other settled areas along the traverse. Here are huts and clearings in the forest, each showing signs of the sort of fallow rotation already mentioned, patches of newly cleared ground, of



FIG. 65.—Sparse occupance in southeastern Costa Rica, near the Pacific. Irregular, temporary farm clearings in the forest along a stream; a master stream (Rio General) across the upper part of the picture. Air view looking southwest.

Likewise, between the Costa Rican plateau and the neighboring districts of close occupance, to the northwest and to the southeast, there is sparse occupance among rugged forested slopes, irregular patches of corn, cane, and plantains in mountain valleys (Fig. 65) and irregular patches of fire-cleared pasture on ridges in lower drier areas.

Other areas of sparse occupance are not associated with those of denser

corn, cane, and plantains, and of young forest growth. In a few places along valleys there are larger clearings occupied by banana plantations, and along the coast fringes of coconuts.

Another separate area of sparse occupance is centered on the Panama Canal. Huts and patch clearings in the forest like those in other districts, here most numerous near the artificial lakes, contrast sharply with the exotic works of the Canal. Probably rural

settlement has been stimulated at the historic crossing place, but close occupancy does not appear among the dissected lateritic hills of the isthmus.

Sparse occupancy east of the Canal along the north coast of Panamá almost adjoins the Canal settlement and yet is distinct from it. This is the San Blas district, where Indian villages occupy cays offshore, coconut groves fringe the beaches, and patch clearings of corn, cane, and plantains are scattered through the forest on the mainland.

The string of cays comes to an end near the eastern boundary of Panamá, and beyond this the scattered occupancy near the coast in Colombia represents a separate settlement of patch clearings along valleys of the western slope of the Western Andes.

**BLANK OCCUPANCE.** There remain to be mentioned several blank areas between settled districts (Fig. 62). Some of these are in lowlands and others in highlands. They include an interior area north of British Honduras; rugged forested slopes of northwestern and southeastern Costa Rica; and dissected forested mountains of western and eastern Panamá.

**GENERALIZATIONS.** It is evident that the traverse, following a zig-zag course through Central America, touches various districts without indicating their extent or defining their relations to each other. The reconnaissance pattern is still to be completed. Yet from this one traverse a few generalizations may be suggested.

1. The grades of occupancy, appearing like spectral bands along the traverse, may be thought to occur as segments of concentric rings centering in the principal separate communities of the region. But in this connection it is to be noted that the distinction between grades generally is not only quantitative but qualitative and is based on local surface differences

rather than on distance from a central nucleus.

2. The surface differences affecting habitability seem to be largely in distribution of precipitation, in ruggedness of land forms, and in maturity of soils. Areas of complete and close occupancy appear only where there is evidence of both rainy and dry seasons and a preponderance of smooth land. Throughout the length of Central America they are in a belt of immature volcanic soils, high in some places and low in others (Fig. 63). In areas of sparse occupancy there is conspicuous concentration of settlement in valleys on immature alluvial soils (Fig. 65). Mature soils are conspicuously unoccupied except for pasturage in a few places.

3. The areas of complete and close occupancy show marks of European culture in their towns and farms. In some areas of sparse occupancy there is a European touch in plantations or grazing lands, but in most places there are marks of primitive culture in hut villages and forest clearings. In most of the areas of complete and close occupancy as well as in those of sparse occupancy small-scale subsistence farming is more in evidence than large-scale commercial farming. Signs of productive activity other than farming are few and minute.

4. The distribution of the types of occupancy along the traverse suggests the divisions of a political rather than of a physical map. In general the pattern accords with a concept of the Central American nations as separate groups of people isolated from each other.<sup>1</sup> But it does not substantiate the idea of the separation of these nations by natural barriers. National boundaries do not coincide with natural boundaries or follow uninhabited zones but cut through outlying communities. Therefore between these

<sup>1</sup> See R. S. Platt, Central American Railways and the Pan-American Route, *Annals of the Association of American Geographers*, Vol. 16 (1926), pp. 12-21.

nations, based on major concentrations of population, boundaries apparently have not been set with respect to local barriers or population groups in the

boundary zones but have crystallized according to the relative political influence extending into these zones from more or less distant major centers.

## 2. SACATEPÉQUEZ<sup>1</sup>

### A FARM IN HIGH HIGHLANDS, GUATEMALA

The old trail between San Juan and San Pedro Sacatepéquez winds its way among hills and valleys at an

Among many farms the one under consideration occupies a rounded spur between ravines (Figs. 66 and 67).

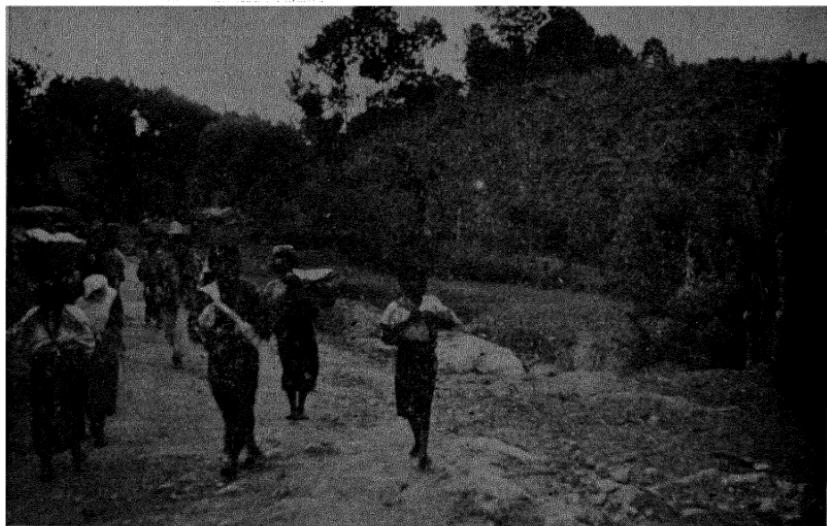


FIG. 66.—Cornfield slope of Sacatepéquez Farm in the right background. Pinewoods on the spur. Road between San Juan and San Pedro, traveled by neighbors on the way to and from market, in the foreground.

elevation somewhat higher than that of the smoother plateau area near Guatemala City [Fig. 49 (2)]. Here the altitude is about 6,500 feet and the local relief about 300 feet between narrow valley bottoms and rounded ridge tops. The climate is warm and moist in summer and cool and dry in winter, with occasional frost. The landscape is mottled with pinewoods in irregular clumps and cleared fields of various sizes and shapes spreading over hilltops and valley slopes.

A few pine trees on the highest part of the spur are the last remnants of a grove that only recently has been cut down. A hand-powered sawmill is still in the process of reducing the pine logs to boards. Now that this bit of woodland has been cleared, the whole top of the spur and its western and northern slopes are occupied by a cornfield, about six acres in extent. The soil is brown clay loam, probably residual on igneous rock, possibly containing recent volcanic ash. Slopes are slight

<sup>1</sup> Field work in February, 1936.

on the upland, but there are steep spots on the side of the spur with a maximum of 30 degrees at one point. Gullying is not in evidence. Most of the field except the part recently cleared has been replanted in corn, year after year, without rest or rotation.

Plowing and cultivating are simple but adequate. The crop is planted in spring, grows through the moist summer, and is ready to harvest in autumn. The yield is about 12 bushels per acre. Beans are interplanted with corn in part of the field.

Corn is the main staple of food supply for the farm family throughout the year, and a surplus is carried to the market town of San Pedro to sell in exchange for other supplies for the household.

The farmhouse is a simple structure of mixed materials: pine wood, adobe, and grass thatch. The farmer and his family are Indians who speak little or no Spanish and have little or no contact with the world outside their community.

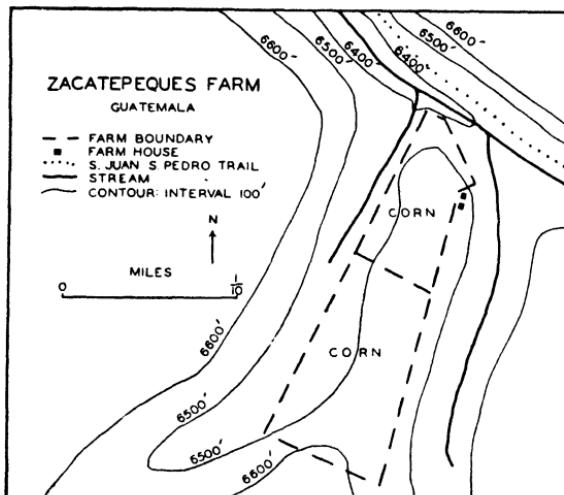


FIG. 67.—Land use in Sacatepéquez farm.

### 3. MIRAFLORES<sup>1</sup>

#### A COFFEE PLANTATION IN LOW HIGHLANDS, GUATEMALA

Eight miles southwest of Guatemala City on the road to Antigua is a group of earth-covered mounds [Fig. 49 (3)]. Stone carvings and bits of pottery mark this as a site of Mayan culture. This place may well be imagined as a pre-Columbian seat of civilization. The environment is healthful and productive, the temperature never hot and never frosty, the rainfall adequate but

not excessive, the volcanic soil unleached and fertile. Perhaps human occupancy has been uninterrupted, and descendants of the mound builders continue to inhabit the area.

Nevertheless, the monuments are unconformable ruins not recognized by the present inhabitants as family heirlooms. Even though present occupancy may have some indigenous

<sup>1</sup> Field work in January, 1938.

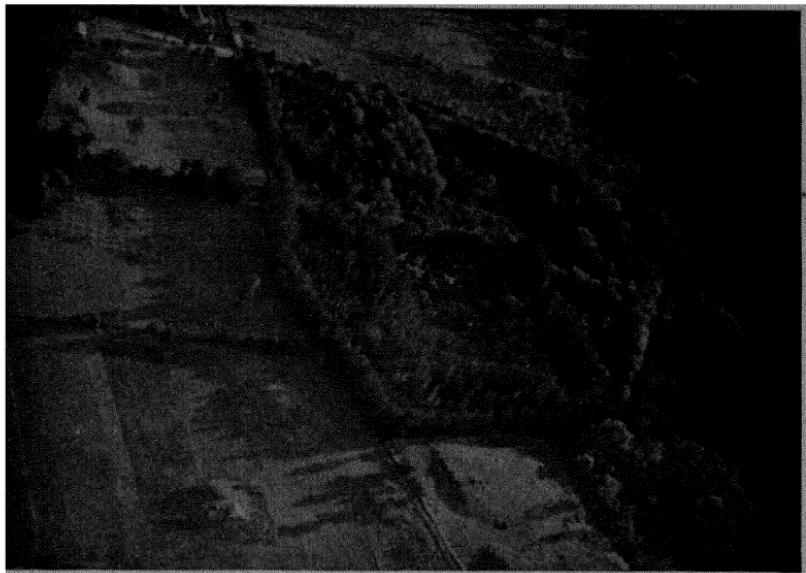


FIG. 68.—Air view of Finca Miraflores, looking northeast. Coffee and orange groves in center and at right. Pastures and cornfields at left and below. Pre-Columbian mounds visible in open fields.



FIG. 69.—*Casa grande*, Finca Miraflores. A house of the Colonial Period built on a mound of the Pre-Columbian Period. Bamboo, palm, and cedar shade trees.

features, it is as a whole distinct from these ruins.

**COFFEE FINCA.** The mounds are on the land of a farm known as Finca Miraflores (Fig. 68). The owner is a Guatemalan of Spanish descent, a man

There are about 25 laborers living permanently on the property, most of them of Indian blood. For each there is a one-room house, of wood, clay, and thatch, and a plot of ground for producing supply crops.

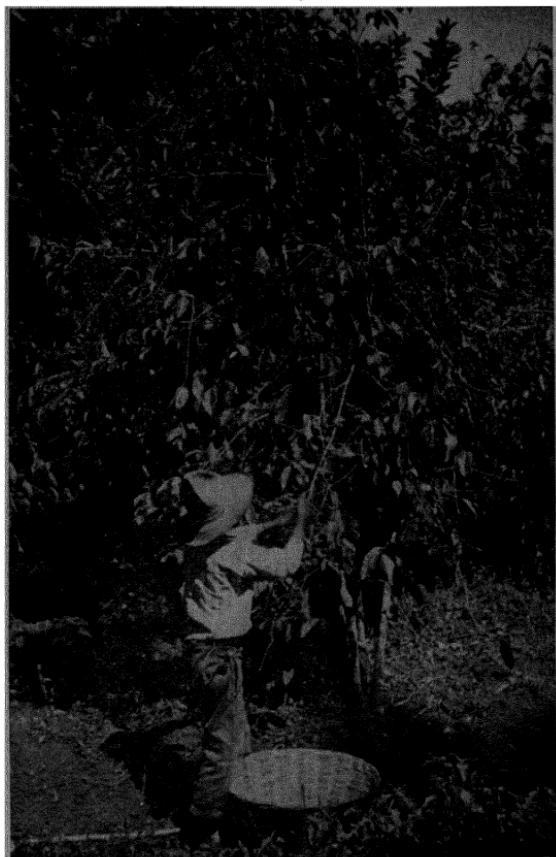


FIG. 70.—Boy harvesting coffee, Finca Miraflores.

of cosmopolitan interests and culture, widely traveled, familiar with affairs of state. His wife is a Colombian of Spanish descent. The *casa grande*, in which they live, is a fine old Spanish house—not old in relation to the mound on which it stands, but old as the central feature of a modern farm (Fig. 69).

The primary function of the farm is coffee production. Of the 600 acres in the property, 170 acres are occupied by coffee. The place is near the upper limit of coffee growing, at an elevation just over 5,000 feet, where the yield is light but the product of high quality. Because here the plateau surface is undissected and nearly flat, deep

furrows are used to provide the rapid drainage demanded in coffee culture. Most of the coffee is shaded and seems to grow better than plants in the few spots that are unshaded. Some of the shade is provided by old cedar trees, which were planted before coffee was introduced. For regular shade planting, orange trees have been used, yielding a secondary crop as well as shading the main crop. For temporary or supplementary shade, plantains are used. These grow quickly and also yield a secondary crop, although at such an altitude they produce poorly.

Coffee is harvested three times a year, care being taken to pick only ripe berries. The change of seasons is not sharp, between the long season of moderate rainfall and the shorter season of moderate drought, and

accordingly harvest seasons are not sharply distinguished.

Men, women, and children engage in the light work of harvesting (Fig. 70). The baskets of berries are carried on burros to the drying floor, whence the crop is taken to Guatemala City to enter the stream of coffee flowing to the United States.

The supplementary crop of oranges is an increasing interest. Orange trees occupy 100 acres, partly overlapping with coffee. The harvest period extends through a large part of the year, and there is a good market for the fruit in Guatemala City.

A third crop occupies more land than either coffee or oranges. This is corn, 250 acres, the old staple food crop of the region, a link between the present indigenous laborers and their prehistoric past.

#### 4. MAYA<sup>1</sup>

##### A BANANA PLANTATION IN THE CARIBBEAN LOWLANDS, GUATEMALA

In the eastern lowlands of Guatemala is a forest clearing containing monuments of an early Mayan city (Fig. 71). The ruins of Quiriguá are on the flood plain of the Motagua River 70 miles upstream from the Caribbean coast and 3 miles downstream from the mountains [Fig. 49(4)]. The site is almost a mile from the present course of the river but is probably on an old natural levee beside a former channel. It is not evident under what circumstances this flood plain of the tropical rain forest, now drenched with an annual rainfall of more than 100 inches, was the chosen seat of a great civilized culture.

In any case, former occupancy of the area was certainly quite different from that of the present. After centuries of abandonment the flood plain is now reoccupied in a way that is no less worthy of interpretation even though lacking the romantic mystery of the buried city.

MAYA FARM. Adjoining the small clearing strewn with Mayan monuments is a unit of productive occupancy called Maya Farm (Fig. 72). This establishment is not "Mayan" except by virtue of proximity to the Mayan ruins; and it is not a modern counterpart of the ancient advance of civilization in this tropic flood plain, although it might be called an advanced outpost of another civilization which here reaches its frontier. Though only an outpost of modern civilization, Maya Farm is a basic unit in the large enterprise of which it forms a small part. The United Fruit Company could continue without this particular farm, but it could not continue without many similar units of which this is a typical example. Maya Farm is one of 24 such units distributed along the Motagua Valley (Fig. 73).

The farm occupies a section of the flood plain on the north side of the river. The area is about 4 square miles,

<sup>1</sup> Field work in January, 1933.

One-third of this is virgin forest, a dense stand of tall trees and vines, broad-leaved evergreens flourishing in a perpetual abundance of heat and moisture. It is tropical forest of the most luxuriant sort, not jungle in the sense of tangled thicket in which walking is difficult, but high woods in which sunlight is the limiting factor and the competition of tall growth

ground while the banana plants are growing up. Removing the fallen timber by burning is unnecessary and would be inconvenient. There is no dry season, wood decays rapidly, bananas are planted before the trees are felled and start growing before forest leaves have wilted. Trial burnings seem to have hindered bananas and encouraged their worst enemy, grass.



FIG. 71.—Ruins of Quiriguá in a forest (selva) clearing, Maya Farm. Carved monolith at the right. View looking north.

leaves the ground fairly dark and free of undergrowth. There is great variety, but most of the trees are fast-growing types of no value for lumber. Mahogany and other cabinet woods are lacking.

The virgin forest is at the north end of the farm, away from the river, where the flood-plain land is low, heavy, and swampy, and adjacent hill land is leached and infertile.

**BANANA CULTURE.** The rest of the farm has been cleared for bananas. The process is one of felling the forest and leaving the wood to rot on the

The banana "bits" are planted regularly, 168 per acre. From these, numerous shoots spring up, and three or four are left growing from each mat so that the mature plantation has about 600 mother plants per acre.

Of land once cleared and planted to bananas a large proportion has been abandoned and is now being reoccupied by second-growth forest (Fig. 72). By soil analysis or by trial and error the better tracts of land have been discovered, and unprofitable plantings have been abandoned. The pattern of good and bad lands is intricate, and a

fine discrimination has been shown in areal selection so that tracts of present production are very irregular. In general, the productive lands are on the natural levees, and the abandoned lands are at a greater distance from the river where drainage is poor and the soil heavy, near the still swamplier

1,000 acres, made possible by construction of a carefully planned system of drainage. Ditching at intervals has been a necessary feature even in the higher level lands, and recent improvements have been chiefly in respect to enlargement and extension of primary and secondary drainage lines and

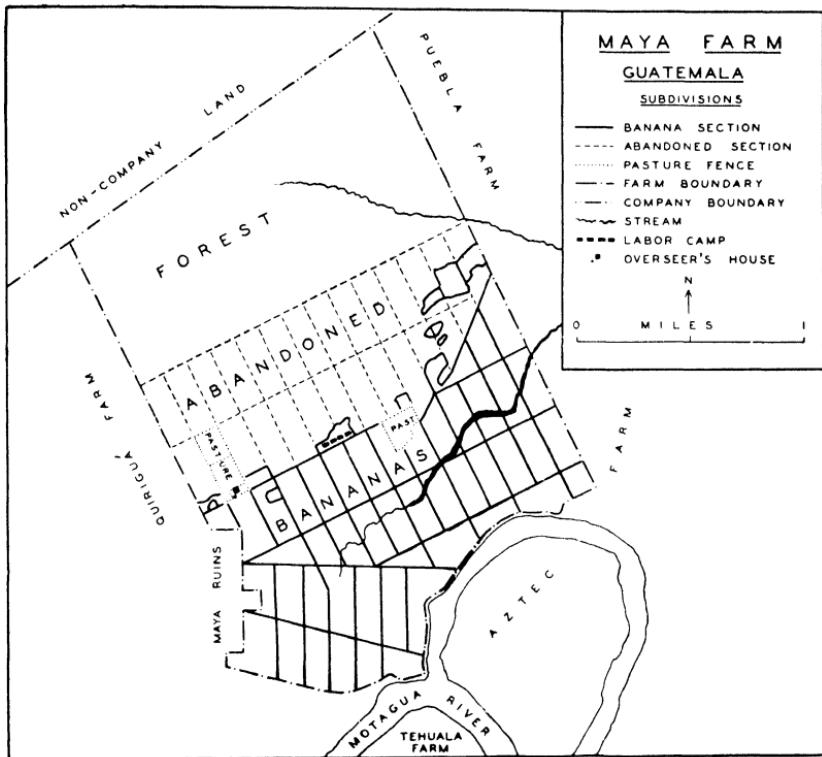


FIG. 72.—Land use in a fruit-company banana farm.

lands that have been left in virgin forest. Not only have these lower lands proved to be less productive from the outset, but they have been more subject to infestation after a few years by the Panama disease, a blight that practically annihilates the crop.

After reduction of the plantation area to about 800 acres, hardly half the previous maximum, there has been some increase to a total of about

construction of a few dikes taking advantage of surface configuration as revealed by a detailed topographic survey.

Because the farm is practically all flood plain, occasional flooding is to be expected in almost every part of it. The river rises high enough to flood the bananas about four times in a decade, a phenomenon that does no harm if the river subsides within 3 days and

the land is drained off promptly. In fact, such floods are beneficial in depositing new soil and helping to stave off the Panama disease.

Of irregular natural phenomena, winds have been more destructive than floods. Tropical cyclones seldom if ever strike here in full force, but a central hurricane path lies near enough

month. But there is a period of somewhat less rainfall from February to May, and this favors more rapid maturing of fruit, with consequent increase of production from February to July.

**PRODUCT.** The annual output of the farm is between 250,000 and 300,000 stems of fruit for the American

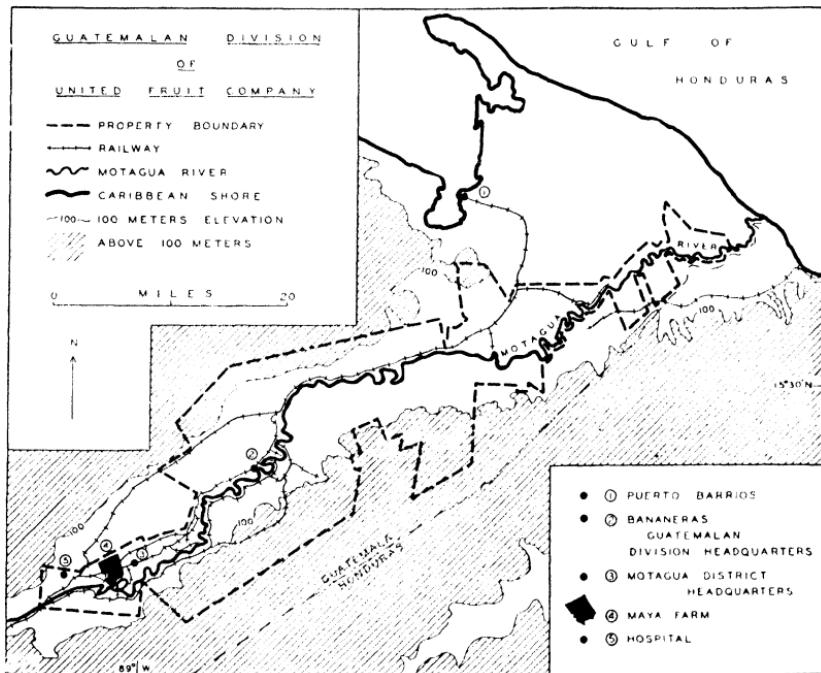


FIG. 73. —Lower course of the Motagua Valley.

for violent peripheral winds to reach the area three or four times in a decade. Expectancy of strong winds is greatest in May, June, and July, but other seasons have had a share of wind destruction. Because banana plants are not only delicate but also fast-growing, wind damage is only temporary, interrupting production for a few months at most.

In general, seasonal changes are slight, with no dry season and no cool season and bananas ripening in every

market. This is equivalent to a capacity of between 350,000 and 400,000 for the English market, the difference being due to the picking of less mature and therefore more quickly produced fruit for the more distant market.

This output involves a capacity for cutting and transporting 6,000 stems of American fruit in one day. The fruit matures at a rate that allows for cutting a week's quota at one time. After cutting, immediate shipment is required. Therefore, harvesting on one

day a week is expedient. Organization of the farm is based on this fact.

Prompt shipment is made possible by railway connection with the port near the river mouth. The farm has a siding on the railway at which the internal transportation system of the farm comes to a focus (Fig. 74). This

12 tramcars and 37 mules for performing this weekly operation.

LABOR. The quota of laborers is about 120, organized primarily to solve the problems of harvesting and transporting the crop—40 cutters, 40 mule drivers, and 40 common laborers for maintenance work on tracks and

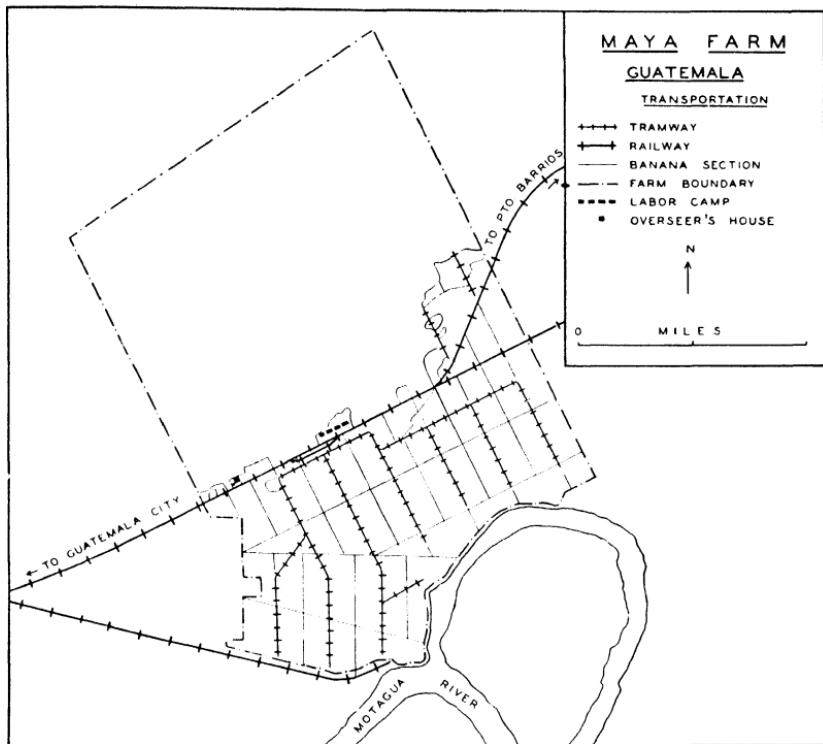


FIG. 74.—Transportation lines, buildings, and producing areas in Maya Farm.

system consists of a tramline of 24 inches gauge ramifying through the plantations in a pattern that provides a branch within 200 yards of every spot. Thus men and mules have to carry the 50-pound stems only short distances, to points where they are loaded into tramcars of 50 stems capacity to be drawn by mules to the railway siding and there transferred to railway cars of 300 stems capacity (Fig. 75). The farm has a quota of

ditches. Critical activities being confined to one day a week, the whole force is available for other work on other days. Among such incidental operations the cleaning of plantations occupies the most time. Weeds and suckers in the plantations are cut with machetes, an endless process covering the whole area about once every three months.

Forty per cent of the laborers are Guatemalans from the plateau, peace-



FIG. 75.—Transfer of bananas from a plantation tramcar to a main-line railway car, at a plantation siding, Motagua District, en route to the port.

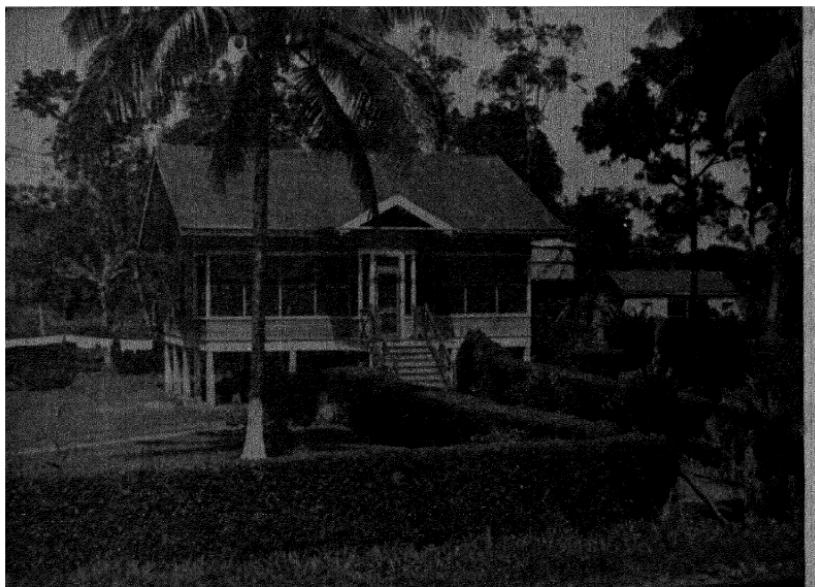


FIG. 76.—The overseer's house, Maya Farm. View from the railway, looking north.

able and tractable Indians; 30 per cent are Central Americans from El Salvador, Honduras, or Nicaragua, less tractable mestizos; and 30 per cent are Jamaican Negroes, the most effective laborers. The Guatemalans also are desirable laborers, and the company would prefer to employ more of them rather than to import labor but finds them reluctant to come down to the lowlands.

The laborers work under a foreman-laborer, who has risen from the ranks. In charge of the whole farm is an American overseer, who with his family, lives a life that is isolated but otherwise pleasant and comfortable. The overseer's house is an attractive modern bungalow surrounded by well-landscaped grounds (Fig. 76). Across the lawn is the farm office in a small separate building, and beyond the garden is a pasture in which are kept two fresh cows for the family milk supply. A pasture here is started in the same way as a banana plantation, by first planting tufts of grass in the forest and then cutting down the trees and leaving them to rot on the ground while the grass is establishing itself.

The laborers' quarters are in a separate grassy clearing. They consist of a row of well-built barracklike "camps" providing a one-room dwelling for each laborer and his family. The design is simple but adequate. Floors are high and dry. Good water is supplied by rain on the roof, supplemented by a well for the season of less rainfall. Wood for fuel is gathered easily as needed. Vegetable gardens and fruit trees are not much in evidence. Part of the food supply is produced locally, but 60 per cent of it is brought from the plateau where production is cheaper, because of more abundant labor and less abounding pests.

There are no other forms of occupancy on the farm. The laborers' camps and supervisor's house front on the only highway, which is the railway

36 inches gauge crossing the farm on its way from the plateau to the Caribbean coast (Fig. 74). It is the railway that has served as a line of attachment in the occupancy of the whole Motagua flood plain.

**MOTAGUA DISTRICT.** As already indicated, the Maya Farm is part of a much larger enterprise, one of many similar units (Fig. 73). A tract of 1,000 acres has been found large enough for one unit of production under one overseer. Accordingly, eight farms have been established along the railway in the part of the flood plain close to the highlands, for the development of 8,000 acres of banana land. These form the Motagua District, an administrative unit 12 miles long and 3 miles wide, with an engineer to plan tramlines and drainage systems, bookkeepers to handle accounts, and a superintendent in general charge of district affairs.

In addition to the eight company farms, there are a few independent farms in the area, able to operate by reason of the company's marketing facilities. They sell to the company, contracting for the delivery of certain quantities of fruit to be shipped through the company farms. The independent establishments are smaller than those of the company, the largest a few hundred acres and the smallest 5 acres.

Encouragement of independents has been in accordance with the company's desire to have Guatemalans feel that the banana business is not entirely an alien enterprise. But the arrangement is not wholly satisfactory for the company; for contract prices and quantities are necessarily inflexible with reference to market changes, and the quality of fruit tends to be lower than in company farms.

**GUATEMALAN DIVISION.** Lower down the river toward the coast are two other districts each containing about eight farms strung along the railway. The three districts together

cover practically all available banana lands of the Motagua Valley and form the Guatemalan Division, one of the eight producing regions of the United Fruit Company. A manager presides over the division, with headquarters in a central town, in which are located railway shops and warehouses, and technical staffs of engineers, draftsmen, and lawyers. The only divisional establishments not located in the central town are the hospital, which occupies an airy site upstream in the highland foothills, and the docks at the railway terminus on the coast (Fig. 73).

Puerto Barrios is not at the river mouth but on the seashore some miles to the north beyond the delta, at a place where hills enclose a well-protected harbor.

The oldest banana farms are at the place where the railway from the port first reaches the river flood plain. From this point, farms were established farther and farther upstream until development reached the foothills at the upper end of the Motagua District.

Now the only large area of alluvial lands still undeveloped is in the delta near the river mouth, and here drainage conditions are poor. An advance into the delta involving branch-railway extension and a drainage project is now under way.

Nearly all the older farm lands have become unproductive and have been abandoned. The Panama disease is still an unsolved problem. Additional pathological difficulties have appeared. Will banana production continue to migrate, or can it become a permanent occupant of fertile land? Will there be found any other tropical product to succeed bananas on worn out land—a product that, like the banana, is so perishable that its production requires a highly synchronized organization and yet so portable that it can be carried across the sea, unimpaired by picking before maturity, possessing a flavor or other qualities so attractive and unique as to command a large market? Answers to these questions will depend on the success attained by the company in scientific research.

### 5. CONSTANCIA<sup>1</sup>

#### A CATTLE RANCH IN THE PACIFIC LOWLANDS, PANAMÁ

Hacienda La Constancia is in the district of Antón, province of Cochlé, in the "interior" of the republic of Panamá [Fig. 49(5)]. The fact that the hacienda is close to the Pacific and has an ocean frontage does not prevent it from being "interior" in the sense that every place which is far from the historic isthmian crossing place and therefore far from the heart of the country is "interior." The hacienda is 80 miles southwest of the capital city, Panamá.

The property studied is an estate of Spanish Colonial origin owned by a Panamanian of Spanish descent. The

owner's house is a comfortable villa on the bank of a stream, approached by an avenue of coconut palms, surrounded by fruit trees and overgrown with vines. Elsewhere in the hacienda in scattered clusters are the houses of mestizo laborers, of whom there are about two hundred.

Formerly the property had an area of approximately fourteen square miles defined by the ocean on the south, the interior highway on the north, and small streams on east and west. Recently the area has been reduced to about eleven square miles by sale to the government of a tract of land

<sup>1</sup> Field work in February, 1936. R. S. PLATT, Items in the Regional Geography of Panamá, *Annals of the Association of American Geographers*, Vol. 28 (1938), pp. 18-21.

near the shore for rural settlement purposes (Fig. 77).

The land of the hacienda is of two primary types, (1) llano, or savanna, land and (2) natural woodland, of

general they occupy lower land than the grass.

The llanos are undulating uplands, underlain by clay, covered with native grass, green and luxuriant during 8

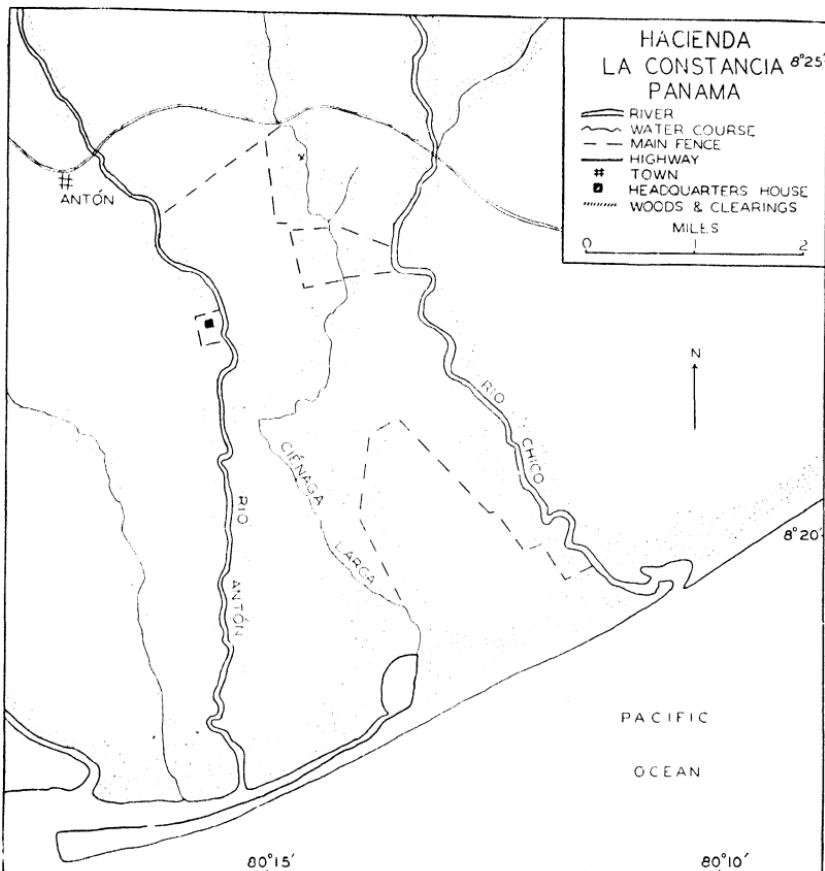


FIG. 77. Streams, woodlands, natural grasslands, and boundary fences of a ranch on the Pacific coast. The distribution of clearings as distinct from woods is not shown. Areas of grassland (savanna, llano) are unshaded, and their boundaries are generalized.

which part is still wooded and part recently cleared. The grasslands occupy interstream areas for the most part. The woodlands are along streams and along the coast. The woods are not confined to valleys and are not everywhere separated from the llanos by distinct physiographic breaks, but in

months of rain, brown and dry during 4 months of drought. The general aspect is like that of tropical savann as elsewhere (Fig. 78).

The woods are of mixed broad-leaved trees and shrubs, some evergreen and some deciduous, with enough bare boughs and brown tints in the

dry season to give an impression of early autumn. Few if any of the wooded tracts are virgin forest.

category of land occupancy—or in two other categories—cropland, and planted pasture (*potrero*). The former



FIG. 78.—Cows grazing in the llanos, Antón, in the dry season. View looking north toward the central mountain ranges.

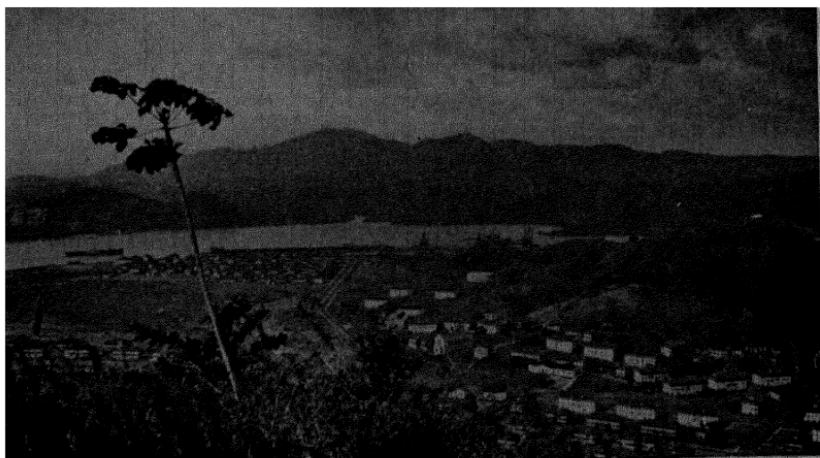


FIG. 79.—Pacific end of the Panama Canal, Balboa. Antón is beyond the range of vision to the left of the central mountain ranges. View looking west, February, 1922.

As already indicated, part of the formerly wooded land is now cleared. In fact, a major part belongs in another

represents primitive shifting cultivation. Every year small patches of woodland are cleared by subsistence

farmers. Trees are cut down and burned in the dry season and supply crops grown in the rainy season. The favorite crops thus produced are corn, cassava, and rice.

All this is incidental to the main function of the hacienda as a productive enterprise. The one year of supply crops is introductory to the planting of grass to occupy the land for an indefinite period—not the harsh native grass of the llanos, but more nutritious pastureage, guinea grass, planted by seed, or Pará grass, transplanted in clumps to spread and occupy the ground. Thus, more than 20 per cent of the hacienda has been converted into pasture land capable of fattening cattle and having a carrying capacity of two head in 3 acres.

Animals do not fatten on the llanos, but they can subsist there through 10 months of the year. Accordingly, cows and their calves graze on the llanos, except during the last 2 months of the dry season, when they are kept temporarily in planted pasture. When calves grow to steers, they are kept continuously in planted pasture until at four years of age they are ready for market. The stock is of unimproved mixed breed, low in beef production but resistant to ticks and other adversities of the region.

Annually about five hundred steers are taken by truck to Panamá City. Current prosperity at the hacienda is due to the accessible city market for beef. But to the inhabitants themselves the Panama Canal is a far-off and unfamiliar phenomenon (Fig. 79).

## 6. CALZADA LARGA<sup>1</sup>

### A TIMBER TRACT IN THE INTERIOR UPLANDS, PANAMÁ

East of the Canal Zone is a tract of forest land held as a source of timber [Fig. 49(6)]. The area is fairly inaccessible, penetrated only by footpaths, in spite of the fact that major lines of transportation across the isthmus are not far away and that ancient routes from ocean to ocean passed directly through the tract, a trail of Spanish treasure moving northward across the isthmus in Colonial days and of California "forty-niners" moving southward across the isthmus in the nineteenth century.

The straggling village known as Casa Larga ("large house") in the midst of the tract does not seem to deserve its name on the basis of its one-room thatched huts; but when its original uncorrupted name of Calzada Larga ("long road") is recalled, this seems entirely appropriate for a station on the old trail midway between the oceans (Fig. 80).

The tract is in the upper basin of the Rio Chagres, bounded by the river on the north and the continental divide on the south (Fig. 81). It has an area of about ninety square miles and is composed of three separate property holdings of Spanish Colonial origin. The middle piece of property, Caimitillo y Chagres, is owned by about fifty heirs, some of them Panamanians and some Ecuadorians. The southwestern piece of property, Chilibre, is owned by a New Jersey corporation; and the northeastern piece, Rio Indio y Agua Clara, is owned by people in Sweden.

The timber rights over all three properties have been acquired by a small lumber company of Panamá City, D. T. Baker, after protracted negotiations with the owners in four nations. The transaction was facilitated when the absentee owners became aware that their valuable timber,

<sup>1</sup> Field work in February, 1936. *Ibid.*, pp. 21-36.

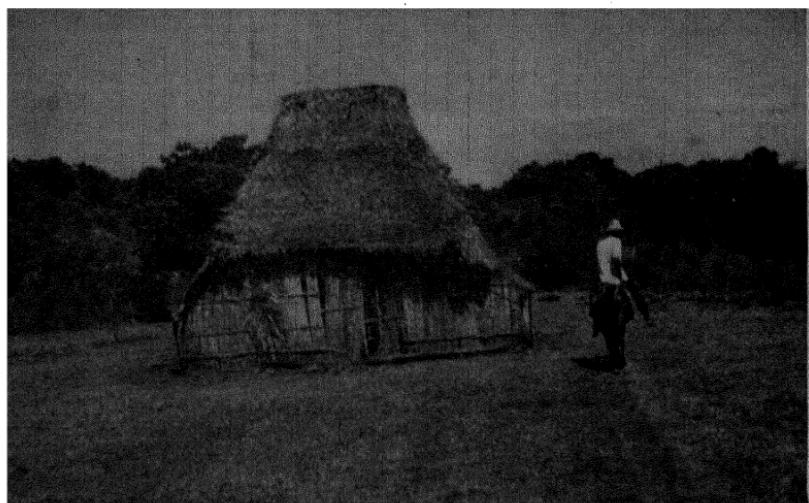


FIG. 80.—Village house, Calzada Larga. Transisthmian trail at the right; mixed mahogany forest in the background.

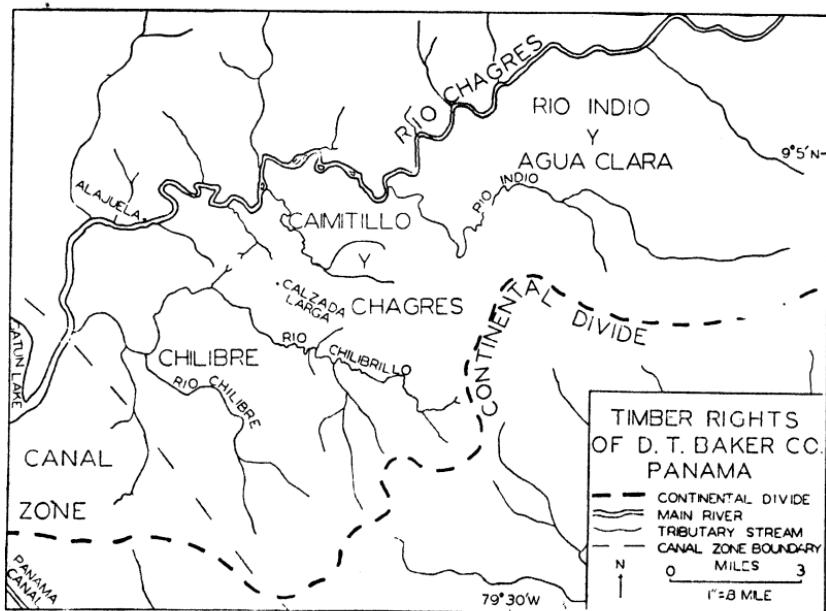


FIG. 81.—Calzada Larga timber area, Panamá.

unprotected from poachers, was gradually disappearing without any return to them. The purchaser of the timber pays the owners a small amount for every tree taken out.

Every man bringing logs down the river is offered as much for his timber as it would cost the company to have the same amount extracted by its own men. If the offer is refused,

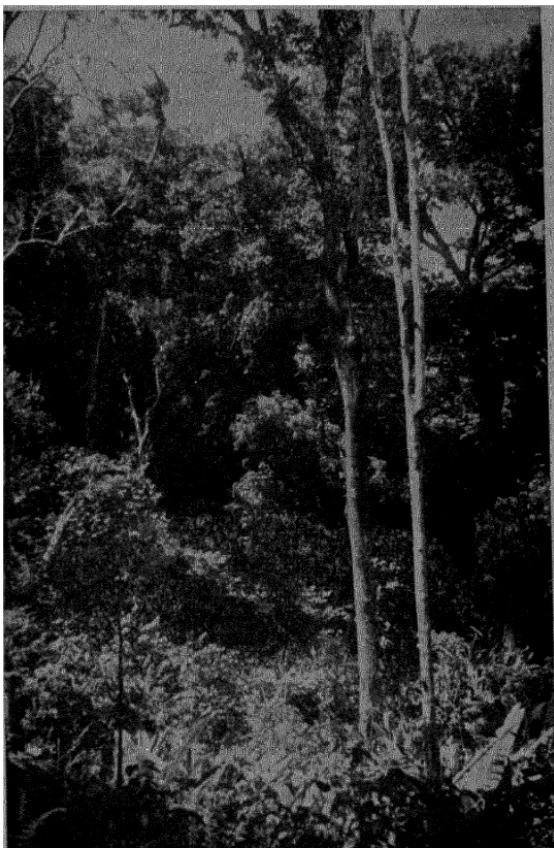


FIG. 82.—Mixed forest, Calzada Larga area.

The Baker Company in its turn cannot afford to guard the whole tract against unauthorized wood choppers but has stopped the stealing of timber by a simple device. A watchman posted at the mouth of the Rio Chilibre impounds all logs driven down the river. Because there is no feasible way of taking logs from the area except by the river, one watchman is suffi-

cient. Every man bringing logs down the river is offered as much for his timber as it would cost the company to have the same amount extracted by its own men. If the offer is refused, the logs are held under embargo pending a court decision. The company might have difficulty proving in court that such logs were from their land, but no cases are carried to court. The lumberjacks prefer to avoid court action and with apparent satisfaction accept the payment offered for their logs. Thus potential poachers become authorized workers for the company.

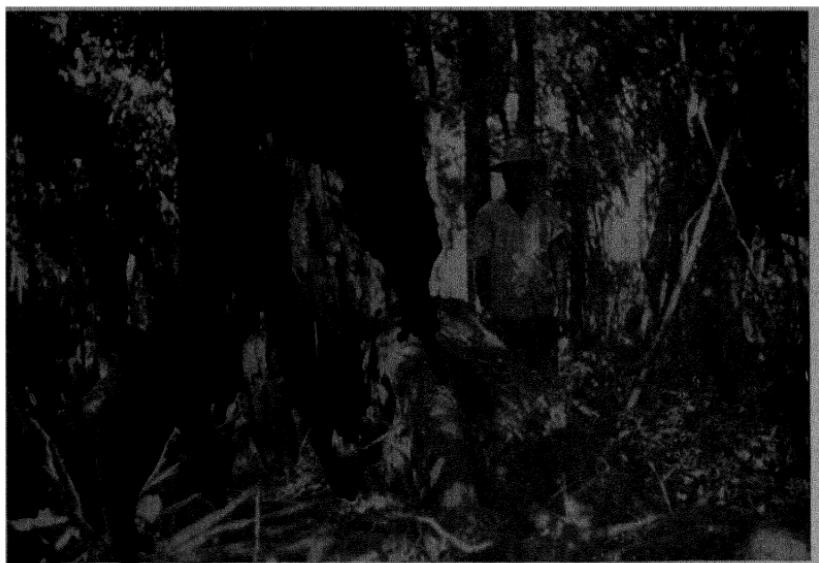


FIG. 83.—Mahogany tree in the mixed forest of Calzada Larga. The notch made with an ax marks the beginning of felling. One of the two lumberjacks stands in the background.

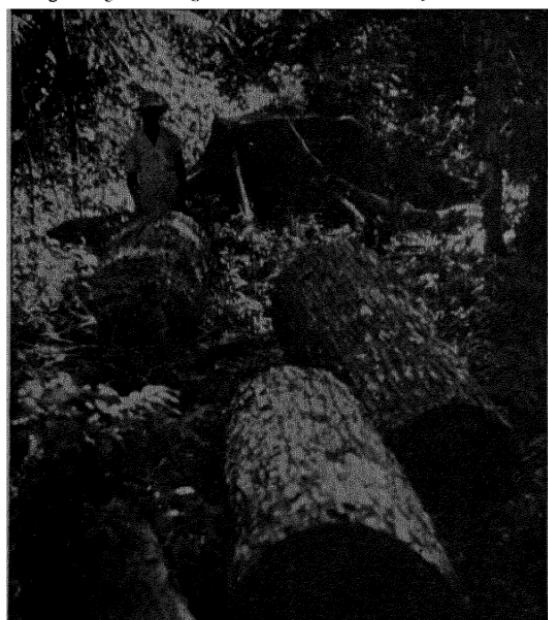


FIG. 84.—Mahogany tree felled in the forest of Calzada Larga. Remaining logs in the foreground, the first log having been rolled away to a near-by stream; stump in the background; lumberjack standing b.

The interest of lumbermen is due entirely to trees of one kind, mahogany. Here in the midst of the isthmus are hills and valleys covered with mixed forest (Fig. 82). It is more luxuriant than the woodlands of Antón and greener in the dry season, but it is distinctly not rain forest. There are even a few grassy openings suggesting the llanos of Antón. Mahogany trees are scattered through the forest, not in pure stands, but more plentiful than is common in such forests, one per acre in the best parts of the area (Fig. 83).

As already implied the work of extraction is not highly organized. Whether the lumberjacks are employees of the company or free lances, the methods are about the same. Men go into the woods at any season, though generally avoiding the rainier parts of the wet season and the early part of the dry season. Two men work together. A tree of good size is selected and felled with ax and saw. Two or three hours are required for felling and two or three days for sawing into logs of movable length, eight or ten feet (Fig. 84). Two men alone cannot move the logs, but they cut an eight- or ten-foot path to the nearest water-course and later with the help of two or three other men roll the logs down the path and into the stream. If circumstances are unfavorable for rolling on a wide path, the logs are dragged lengthwise by a larger gang of men.

For 5 months there is water enough in the smaller tributaries to carry logs down to the main river, whence they are floated along an eastern arm of Gatún Lake to a boom in the vicinity of the Canal. Beyond this point the

waterway is not available for timber, but a highway is available, on which trucks carry the logs to Panamá City. The Baker Company has a small sawmill from which the product is distributed to the local market for cabinet wood.

Some mahogany from Panamá enters world markets. Yet the forests along the old transisthmian route and close to the Canal Zone, containing an abundance of large mahogany trees, have survived to the present and having survived do not now furnish an export product. A reason for this apparent oversight seems to be provided by the facts of the case. Presumably the old treasure hunters were not interested in mahogany, because of their other interests; and the modern exporters are not interested in this particular mahogany, because it is unusually light in weight and therefore classified as of low grade. Botanically the tree is like other Central American mahogany according to seed tests. Seed from this area of abundant seed bearers is in demand for planting elsewhere, and mahogany seed is an export product of the Baker Company. Possibly the low-grade wood is a result of natural conditions too favorable for tree growth, encouraging rapid and abundant development without retardation by drought. The annual rainfall is almost a hundred inches in the Chagres area, somewhat more than in certain other areas of mahogany production. Facts of regional distribution beyond the small area of field observation have a bearing on the subject, and some of these facts are next in order for consideration.

#### REGIONAL SETTING OF CONSTANCIA AND CALZADA LARGA

The preceding descriptions of hacienda and forest are based primarily on field data and only slightly on library data. The following maps and comments are based primarily on

library data and secondarily on field data.

**ISTHMUS OF PANAMÁ.** Attention is directed to the Isthmus of Panamá not as a geographic region of assumed uni-

formity but as an area of land conveniently designated. Certain elements of the areal complex of hacienda and

association of savanna lands with rural population in the southwestern provinces is noticeable (Fig. 86).

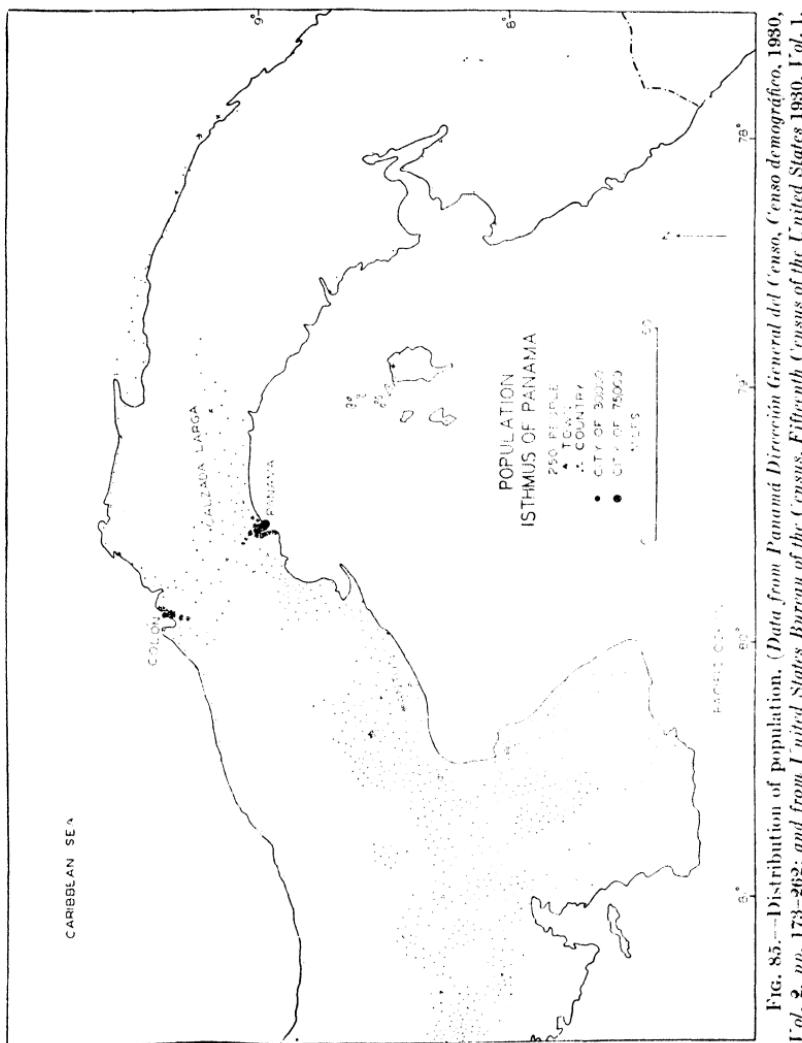


FIG. 85.—Distribution of population. (*Data from Panamá Dirección General del Censo, Censo demográfico, 1930, Vol. 2, pp. 173-262; and from United States Bureau of the Census, Fifteenth Census of the United States 1930, Vol. 1, pp. 1246-1248.*)

forest are thus exposed in a pattern of regional scale.

The map of population (Fig. 85) shows a concentration of people southwest of the Canal Zone in an area including the district of Antón. Areal

In general, the savannas appear to be in areas averaging less than 75 inches of rainfall annually (Fig. 87).

Distribution of other phenomena is consistent with facts thus far presented. In general, the production of

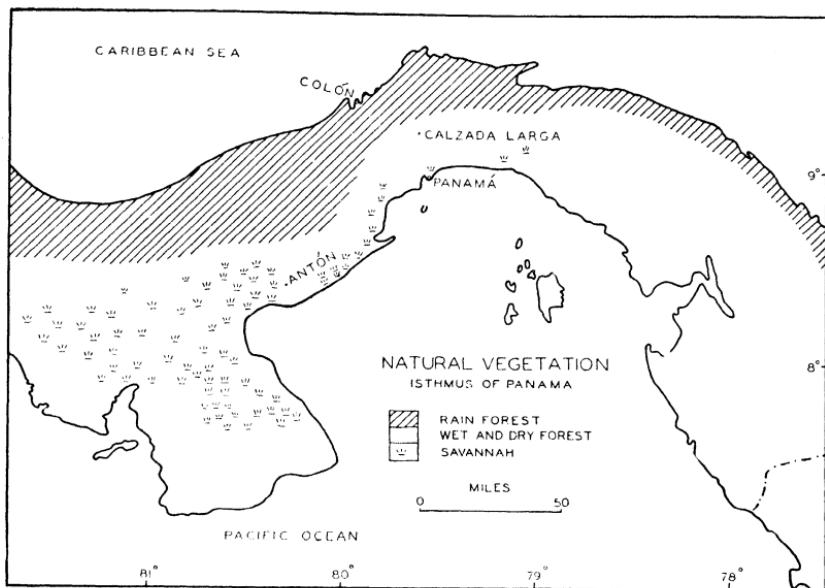


FIG. 86. Types of natural vegetation. (Data from place names in Panamá Dirección General del Censo, Censo demográfico, 1930, Vol. 2, pp. 184-262; and from reconnaissance.)

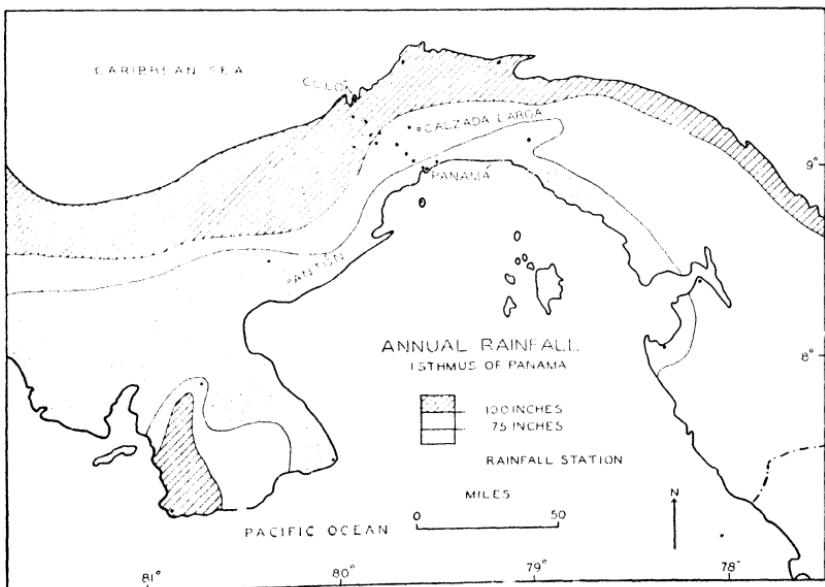


FIG. 87. Amount of rainfall. (Data from W. Sapper, *Klimakunde von Mittelamerika, Köppen und Geiger Handbuch der Klimatologie*, Vol. 2, pp. 31, 44, 45, 54, 64; and from Panamá Departamento de Estadística, *Anuario de Estadística*, 1934, p. 10.)

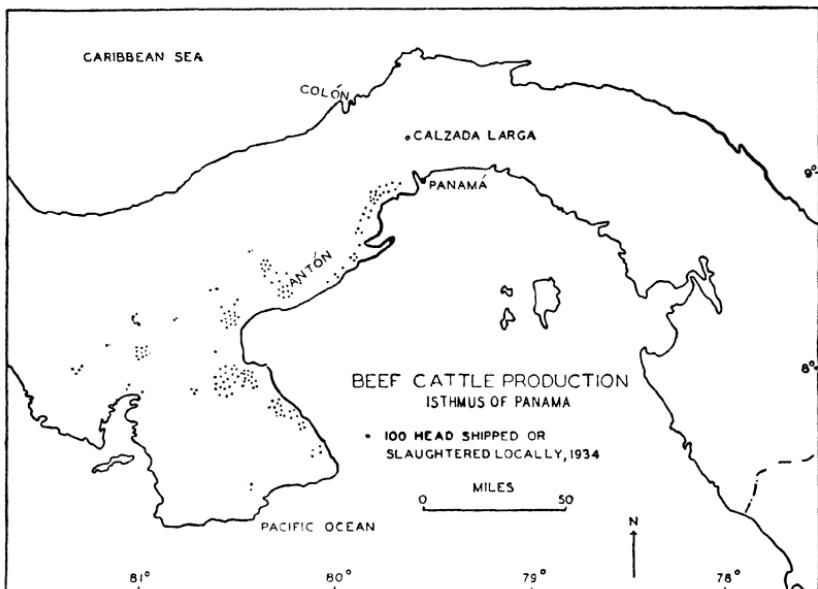


FIG. 88.—Distribution of cattle production. (Data from Panamá Departamento de Estadística, "Anuario de Estadística," 1934, pp. 141, 370, 378, 380, 393.)

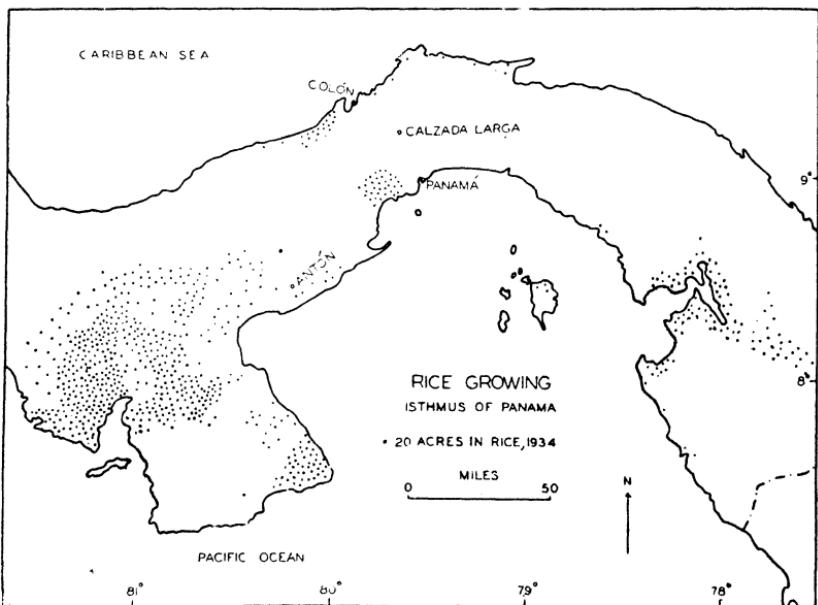


FIG. 89.—Distribution of rice growing. (Data from Panamá Departamento de Estadística, "Anuario de Estadística," 1934, p. 139.)

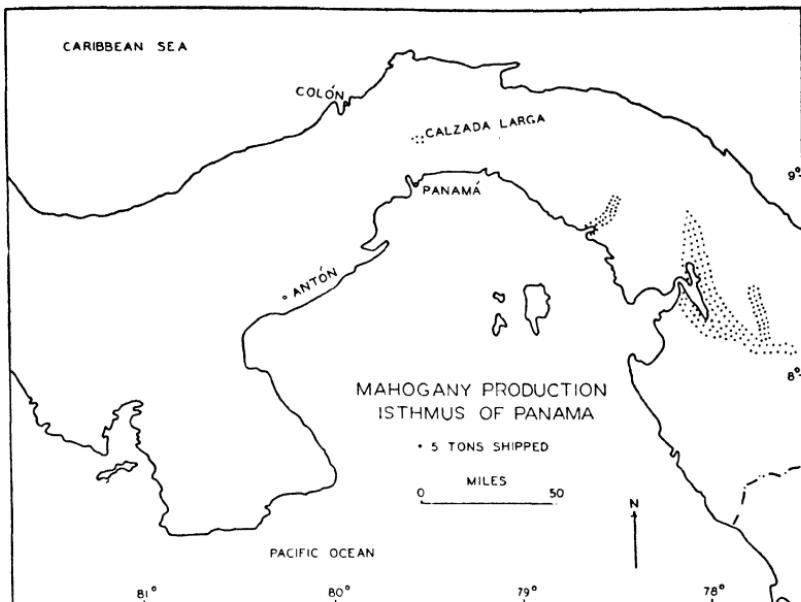


FIG. 90.—Distribution of mahogany production. (*Data from Panamá Departamento de Estadística, Anuario de Estadística, 1934, p. 375.*)

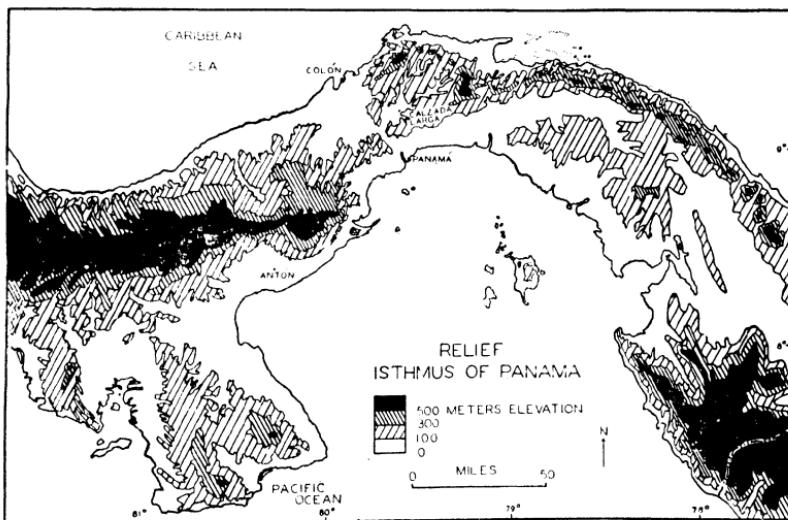


FIG. 91.—Hills and low mountains. (*Data from American Geographical Society, Millionth Map of Hispanic America, Panamá sheet, New York, 1928; and from S.A. Villegas, "Mapa de la República de Panamá, 1:500,000, New York, 1925*)

beef cattle appears localized in the southwestern area of rural population, savannas, and less heavy rainfall (Fig. 88).

One crop provides a rough indication of the distribution of agriculture. Rice has been mentioned as among the favorite supply crops grown in new clearings at the hacienda. Distribution of rice by districts on the map does not correspond in detail with that of other mapped phenomena (Fig. 89), but general localization in the southwestern provinces appears in this case as in others.

Apparently all mahogany production in Panamá is on the Pacific side of the mountains east of the Canal Zone (Fig. 90). This area is characterized not by rain forest or savannas

but by semideciduous forests (Fig. 86) in areas of moderate rainfall rather than of maximum rainfall or severe seasonal drought (Fig. 87). Such distribution of forest and rainfall is consistent with the more pronounced mountain barrier west of the Canal Zone and less pronounced barrier east of the Zone to separate the Pacific slope from the Caribbean (Fig. 91).

The only place where mahogany production appears on the Caribbean side of the continental divide is at Calzada Larga in the Chagres basin, and this is consistent with the additional fact that the Chagres basin is the only area where the main mountain wall is not at the continental divide but farther north near the Caribbean coast (Fig. 91).



## Chapter IV. The West Indies

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The West Indies, a Latin-American region of islands, is disunited more obviously than is Central America. Each island is a separate unit of occupancy, even though less simply and certainly than the map suggests. It is unnecessary to elaborate on such facts as that these units are diverse in size, form, and distribution.

**COUNTRIES AND COLONIES.** Only the two largest are occupied by independent countries. The others, all of subnational size, have been held as colonial possessions individually or in groups, most of them by the chief sea power, Britain, some by France and the Netherlands, formerly active, and some by the United States, nearby and recently active (Fig. 2, page 12). The smaller islands were acquired as second choice by late-comers after Spain and Portugal had had first choice in America. Centuries later it is not surprising that the earlier "birds," grown weaker, have lost their large unwieldy lands while late-comers have continued to hold their small islands. Mere size, of course, does not furnish a complete explanation of colonial status; accessory facts concerning the small islands include the lack of precious metals, as a reason for failing to attract Spain, and the asset of good sugar-cane land as a reason for attracting northern European countries.

Neither island countries nor colonies need be excepted from the generalizations stated in Chap. I. There are small populous areas far distant from large centers as nuclei of small countries, smaller centers as provincial districts, and tracts of unoccupied land as outlying areas (Fig. 92). Though the capital cities are seaports (unlike most of the Central American capitals), they are nevertheless within main areas of settlement. Though most of the boundaries are sea and not land, there is nevertheless a resemblance between an unoccupied land boundary zone and the sea (as an unpopulated area into which territorial power may reach but beyond which it cannot easily compete). Of the three island countries, Cuba has only sea boundaries; Haiti and the Dominican Republic, occupying one island, are separated by a land boundary crossing sparsely populated areas. Within each country there is internal variety of highlands and lowlands and rainy and dry climates.

The colonies may be described as outlying overseas districts of larger centers similar to outlying overland provinces of countries. Graphic indication of such similarity is found in mainland districts already discussed: Yucatán and southern Baja California are reached from the center of Mexico only by sea, as if they were islands; Panamá as an outlying district of Colombia was reached only by sea from the center

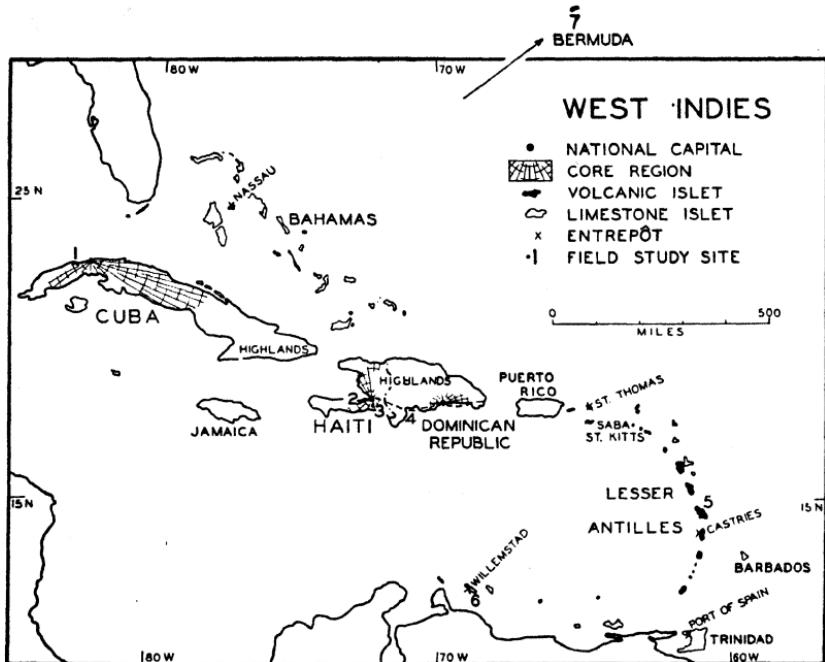


FIG. 92.—Large islands (Jamaica, Puerto Rico, Trinidad) are named and not included in islet classification. Field sites are numbered in order of discussion, beginning with countries and proceeding to large colonies, volcanic islets, etc. Number 4 is used to refer both to a traverse (indicated by a dash line) and to a comparison between Puerto Rico and Jamaica. One core region is shown in each of the countries, but none in any of the colonies. The mother countries of colonies are indicated in Fig. 2, page 10.

of the country; and the Canal Zone is reached by sea from the United States.

To close the analogy between island and mainland organization it may be noted that the transportation systems of the island countries and colonies are like those of Central America, where isolated systems connect only with the sea and where travel from country to country has been regularly by sea (Fig. 93) and now is also by air.

**ISLAND REGIONS.** Regional classification of island territory is in many respects like that of Central America, with somewhat less variety

than on the mainland. In connection with major land forms the West Indies have been mentioned among lesser highland regions (Fig. 3, page 11). But lowland borders are more conspicuous than highland interiors, and the highlands are not very high. In major climatic divisions the islands belong mainly to tropical lowlands of seasonal rainfall, rainier on northeastern exposures and drier on southwestern (Fig. 4, page 12). Numerous spots of low highland, *tierra templada*, are too small to be shown on small-scale continental maps.

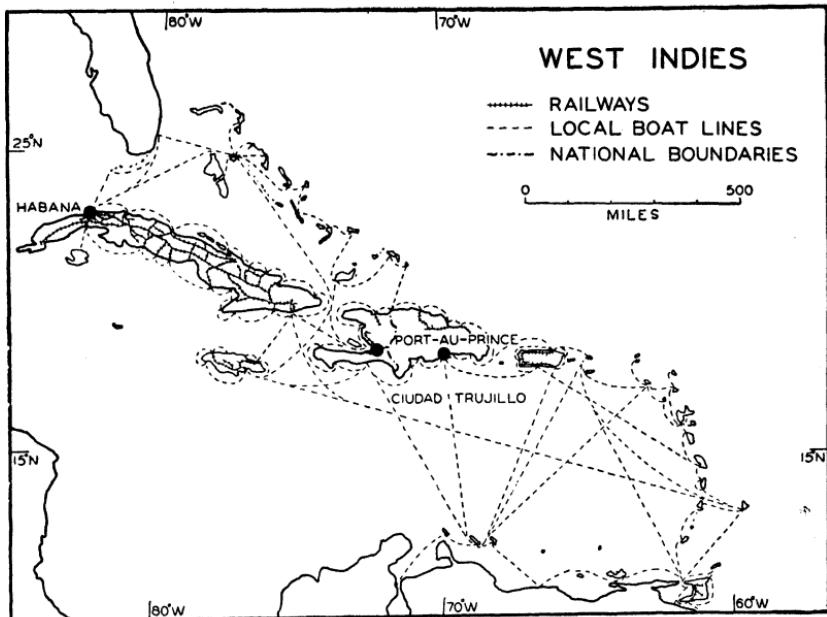


FIG. 93.—Local transport lines shown in the same way as on maps of mainland areas and revealing a similar pattern.

Regional generalizations of occupancy include some contrasts with Central America: the islands are more densely populated, especially in the lowlands (Fig. 8, page 16), and contain much Negro and little Indian blood. These contrasts correspond with island fragmentation, the enduring presence of slightly more favorable lowlands and absence of good highlands, and the pre-Columbian presence of intractable forest Indians and absence of sedentary Indian communities.

### Individual Countries and Colonies

Within these various generalizations more particular distinctions claim attention. The island countries are composed of similar regional

elements; but these combine in different proportions and distributions, and each country is distinctive in character.

CUBA is the largest island—or, rather, Cuba as a country occupies the largest island. The core of the country is in extensive fertile limestone lowlands of the western part of the island, settled by Spanish Colonial planters and their slaves (Fig. 92). Outlying districts include extensive eastern and small western lowlands, occupied in the course of the modern expansion of plantations, and relatively small eastern and western mountain areas. The total area of the island is no greater than that of some Central American countries. But it has a greater productive area,

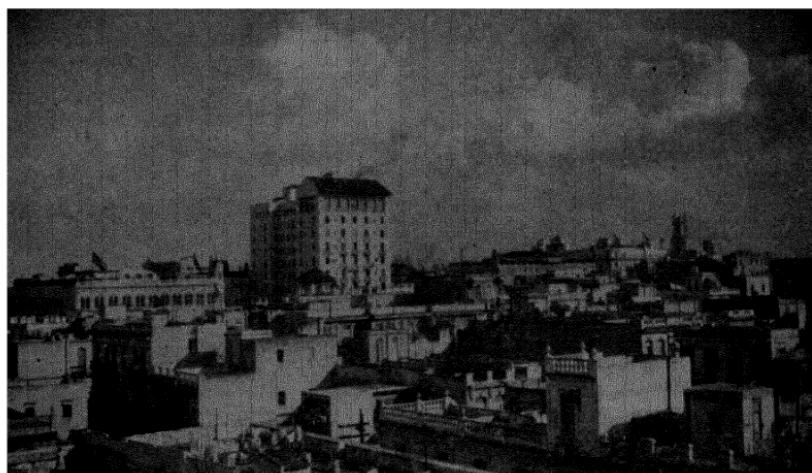


FIG. 94.—Habana, capital of Cuba. View from a rooftop in the central part of the city, looking southeast, February, 1928.

greater all-round accessibility, and more specialized development, mainly in its favored and widely distributed sugar industry but also including tobacco planting in small districts and other minor interests. Accordingly, Cuba has a larger population, a larger capital city (Fig. 94), and much larger foreign trade than any Central American country—in fact, more trade regularly than all Central America taken together and more than all the other islands of the West Indies.

**HAITI AND THE DOMINICAN REPUBLIC.** The island second in size, called sometimes Hispaniola, is occupied by two countries. The core of Haiti is in narrow coastal lowlands of the western part of the island, settled by French Colonial planters and their slaves; the heart of the Dominican Republic is in lowlands of the eastern part, settled earlier by Spanish adventurers (Figs. 92, 95, and 96). Outlying districts of the two

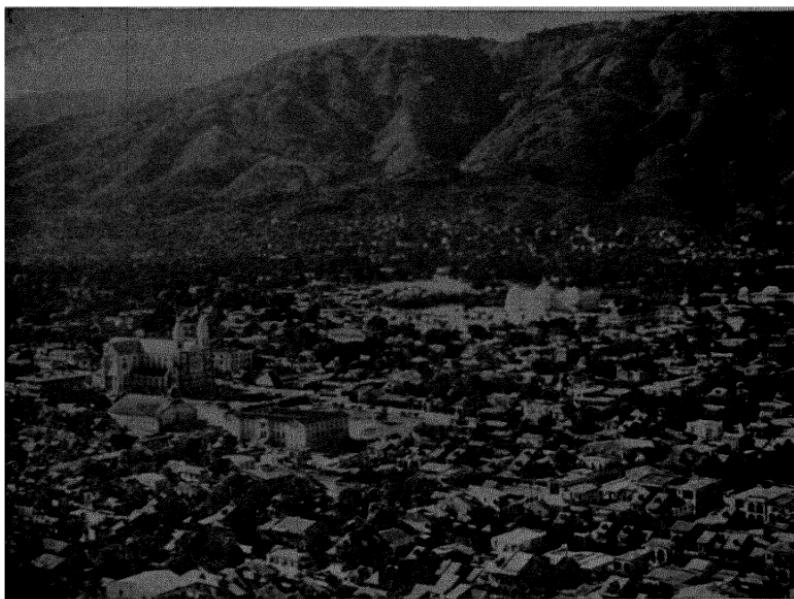


FIG. 95.—Port-au-Prince, capital of Haiti. Cathedral in left center; government buildings in right center. Air view looking southeast from above the water front, September, 1935.



FIG. 96.—Ciudad Trujillo, capital of the Dominican Republic. Local cargo boats and warehouses on the water front. View from the deck of an ocean vessel, looking south toward the harbor mouth and the Castle of Columbus, one of the landmarks of the oldest occidental city in the Americas. January, 1922.

be described one by one, and for preliminary understanding they fit conveniently into a few categories.



FIG. 97.—St. Kitts, British Leeward Islands. A volcanic islet, girdled by fields of sugar cane on lower slopes. Air view looking south, September, 1935.

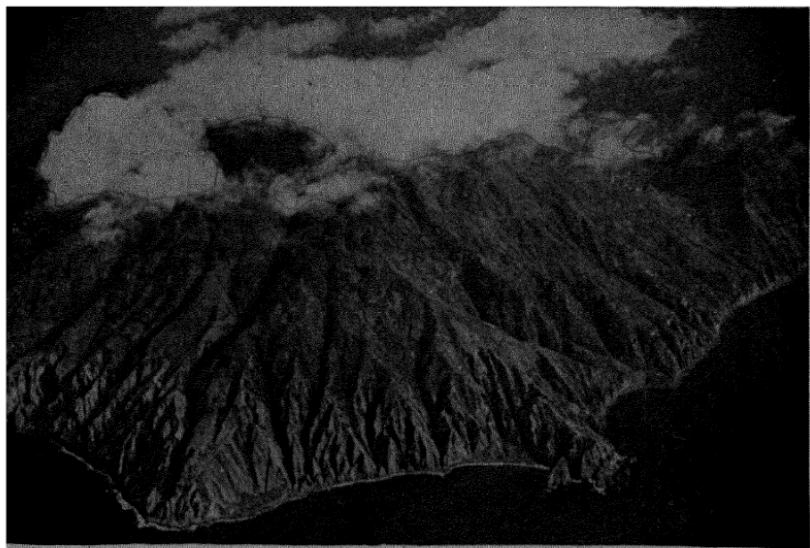


FIG. 98.—Saba, Netherlands West Indies. A volcanic islet having a border of steep eroded slopes without fertile lower slopes. Settlements on less steep upper slopes. Town of Bottom at right below clouds. Air view looking south, September, 1935.

The first category is that of islets of recent eruption, localized in the curving chain of the Lesser Antilles (Fig. 92)—volcanic cones more or less surrounded by narrow lowlands sloping to the sea (Fig. 97), fertile,



FIG. 99.—Barbados, a limestone islet but not merely an elevated reef; more complex in structure and of greater height. Sugar-cane fields; sweet potatoes in left foreground. View looking south in the central area of the island at an altitude of about a thousand feet, January, 1923.

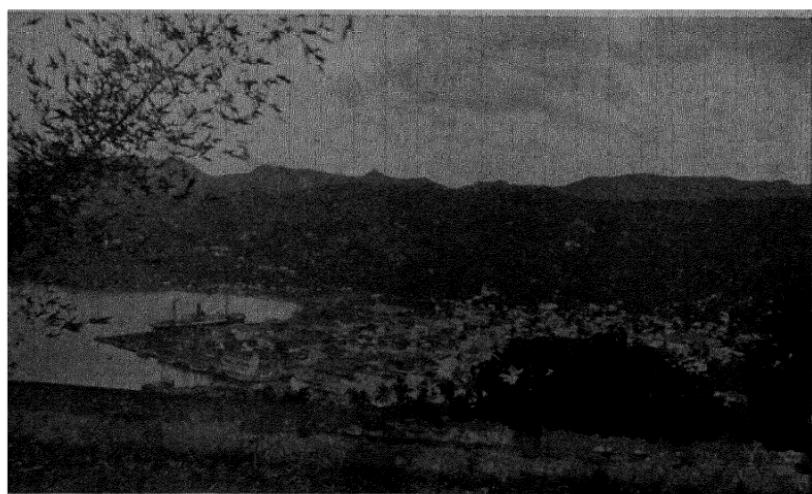
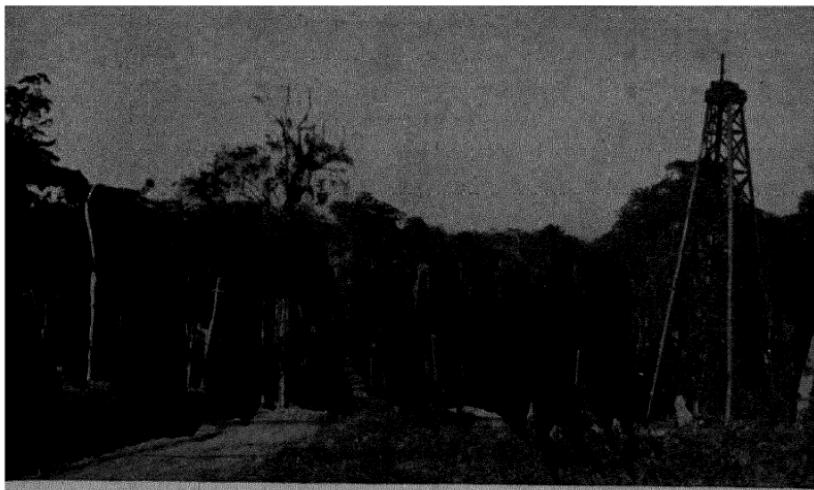


FIG. 100.—Castries, coaling port on the island of St. Lucia, British Windward Islands. A harbor better than most, on a volcanic islet more rugged than most, of old and new strategic value. View looking northeast, January, 1923.

intensively cultivated, and densely populated, recalling volcanic areas of Central America. The inhabitants are Negro descendants of sugar-plantation slaves, still growing sugar but under a handicap of small tracts of land and political barriers in an age of large-scale nationalistic production and therefore turning to minor tropical specialities, subsistence farming, and labor emigration.

The second category is that of small limestone islands, most of them composed partly or wholly of elevated reefs. These are represented by the Bahamas, eastern islets of the Lesser Antilles, and islets of the Nether-



Trinidad. View looking northeast, February, 1923.

lands off the South American coast. They are relatively low, dry, and sparsely populated, their inhabitants supporting themselves by subsistence farming, fishing, and seafaring.

Individual cases escape such generalized description. Striking exceptions appear. For example, among volcanic islets, Saba has a border of eroded cliffs in place of gently sloping lowland and is sparsely inhabited by seafaring people (Fig. 98). Among limestone islets Barbados is relatively high and moist, grows sugar intensively, and has the densest population of any island, volcanic or otherwise (Fig. 99).

Some islets have urban centers more important than their rural settlements. These are ports or harbors well-placed for entrepôt traffic. Such are Nassau, St. Thomas, Castries in St. Lucia (Fig. 100), Willemstad in Curaçao, and the ports of Bermuda (Fig. 92).

A few islands that do not belong in the preceding categories are those along mainland coasts, fragments of adjacent continental areas. Trinidad

is the most conspicuous of these, containing the northeastern tip of the Andean chain and a detached bit of the Orinoco delta, a stepping stone from the West Indies to the mainland of South America (Figs. 101 and 102).

**WEST INDIAN INTERRELATIONS.** The following field studies in the West Indies may seem insufficient to cover so many islands, and they are. But omissions in this chapter are no greater than in the case of mainland areas. In the islands there is no greater local variety from place to place than is found in Mexico and Central America.



FIG. 102.—In the market, Port-of-Spain, Trinidad. People of two groups generally separate in the population, Negroes and East Indians. February, 1923.

The principal contrast between island and mainland areas is in larger interrelations, chiefly of political organization. Water intervening between small islands does not make these bits of land unlike each other but does serve to decrease local connections among neighbors who live and move on land and to increase direct casual connections overseas. With small chance of internal unity on a large scale and great ease of outside interference, the current political division seems to reflect world-wide rather than local connections.

The survival of the same political division seems to depend not on local initiative and local change but on the survival of established world arrangements. New American naval and air bases are tangible evidence that the West Indies are involved already in world changes. The question of future status in world rearrangement applies no less to the three

island nations than to the island colonies. Are the West Indies to be controlled for the benefit of their inhabitants, or for that of people overseas, or for no benefit? This question is pushed into the future, pending world alterations.

### Field Studies

*In Countries.* The field studies deal, not with such current world questions, but with certain durable local aspects of occupancy. Extensive fertile lowlands growing sugar cane on a large scale may be considered the most important land type in the West Indies, and the greatest of such areas is in Cuba. The Mariel District is an example of occupancy in the heart of Cuba (1). Moreover, it represents in a general way modern sugar plantations in the other large island countries and colonies.

In minor lowlands less intensively organized there is small-scale production of other commodities for export and supplies for local use. One example is a cotton farm near Léogane, in the narrow, seasonally dry coastal lowlands of southwestern Haiti, a densely populated but not intensively developed area (2). Here is commercial agriculture near the lower limit of cultivation and commercialization, more characteristic of Haiti than of other West Indian areas.

There are considerable areas of low highland, particularly in the larger islands, where there are dense population, subsistence farming, and some production for export. The most distinctive export crop is coffee, grown generally on a small scale. An example of such occupancy is a coffee farm near Pétionville, in the low highlands of Haiti (3). In this case also, the Haitian example represents plantation farming in its lowest terms.

Small highlands and lowlands, land and water, rainfall and drought, forests and bushlands, intensive and extensive occupancy, all intimately mixed—these are West Indian characteristics which appear in the traverse across the southern margin of the Dominican Republic [4(a)].

*In Colonies.* The two islands next in size, Puerto Rico and Jamaica, bear resemblances to each other and to both larger and smaller members of the West Indies. Their particular contrasts to each other, within the larger resemblances, are suggested by the general impressions of the traverse [4(b)].

The volcanic islets of the Lesser Antilles with their small size, fertility, slave plantations of the past, and dense Negro population of the present are alike in general and distinctive in detail. General impressions of Martinique are presented, to indicate some characteristics (5).

Low limestone islets of less fertility, less moisture, and less intensive productivity also are alike in general and distinctive in detail. The study of a subsistence farm in Curaçao is representative of rural occupancy (6).

A more important and distinctive feature of Curaçao is the entrepôt of Willemstad, developed in relation to the location of the island off the coast of Venezuela, a feature not included in the study.

Bermuda also is classed among low limestone islands, but in this case both rural and urban occupancy are dominated by oceanic location of the group off the coast of North America, as indicated in the summary of field observations (7).

It is only as a matter of expediency that Bermuda, Cuba, and the other islands, large and small, are grouped here together in one chapter. But, as already suggested, the same must be said for the grouping of countries and regions on the mainland; the islands have just as much in common to justify discussing them together.

### 1. MARIEL<sup>1</sup>

#### A SUGAR DISTRICT IN CUBA

Mariel is one of the smaller ports of Cuba, shipping about 1 per cent of Cuban exports. In the district behind the port is the Central San Ramón,

there is a plain at the higher level, somewhat broken to the east but smooth to the south. The district has an area of 65 square miles, of which

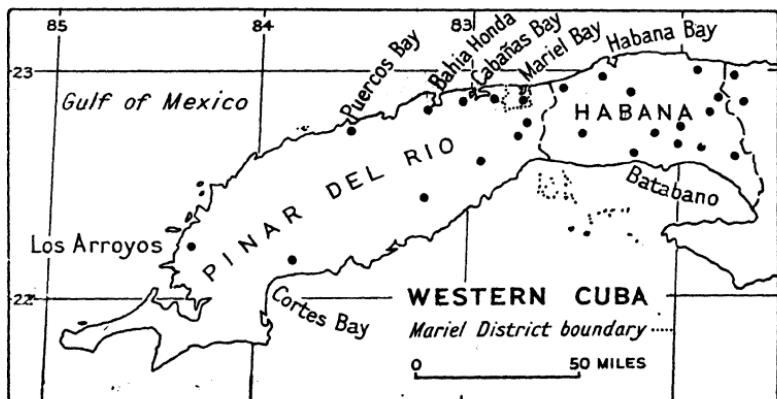


FIG. 103.—Location of Mariel in western Cuba. Large dot indicates a sugar central.

one of 180 sugar mills in Cuba [Figs. 92(1) and 103].

West of Habana the first break in the rocky coast is at the Bay of Mariel. Around the bay is rolling lowland, farm country. East and south of the bay the lowland is bordered by an escarpment 200 feet high, beyond which

about 38 per cent is occupied by sugar cane (Fig. 104).

**CANE LAND.** There is no cane in a strip along the rocky exposed coast or in the swampy land at the head of the bay or on very steep slopes. Aside from these unfavorable areas most of the land is cultivable, and most of it

<sup>1</sup> Field work in February and March, 1928. R. S. PLATT, Geography of a Sugar District: Mariel, Cuba; *Geographical Review*, Vol. 19 (1929), pp. 603-612.

has been cultivated at one time or another. Yet only about half of it is under crops at present. Most of the soil is brown silt loam, overlying limestone, but there are considerable differences in productivity, due to differences in slope and soil. Even where there are

Much poor land is left uncultivated, as being unprofitable in the present state of the industry. In addition, some good land is left uncultivated, to rest for at least one year after a series of cane-producing years and incidentally to provide pasture for work animals.

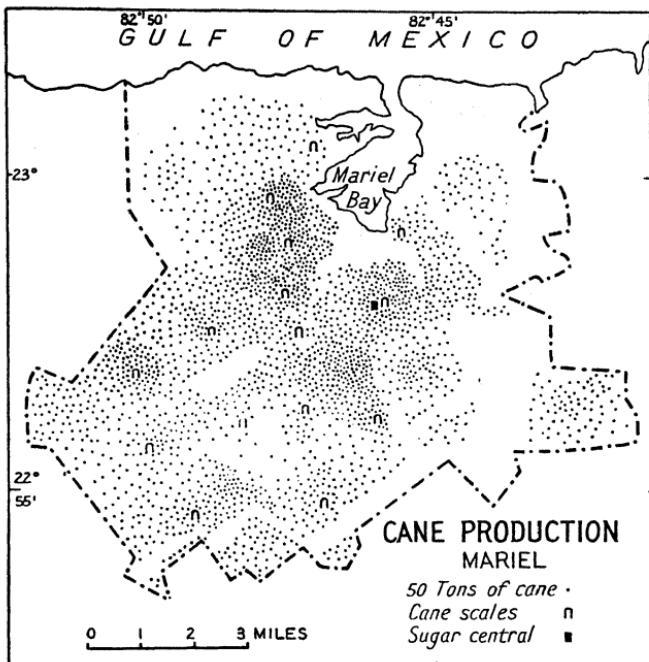


FIG. 104.—Distribution of sugar-cane production in the Mariel District.

not obvious differences in soil type, planters have classified their land from past experience, finding that some fields produce more than thirty tons of cane per acre and others less than fifteen tons the first year after planting. In each succeeding year the yield is about 30 per cent less than the year before until, after four, five, or six years, according to the soil, it is less than five tons per acre. Neglect of soil and delay in replanting, due partly to years of depression and restriction in the sugar industry, have reduced the average yield to less than twelve tons per acre.

The proportion of land left uncultivated tends to be greater in less accessible areas than in those more favorably located.

Thus it appears that the distribution of cane production has obvious relations to land surface features. This geographic fact is a preliminary to the more complex geographic fact that the distribution of land control, production, transportation, population, and the whole human organization of the district forms an intricate pattern of human occupancy of the land.

This pattern is not determined by the natural environment. Many fea-

tures are related only indirectly or historically to natural conditions, and some better adjustments might be made. Yet the pattern belongs definitely in its natural setting, meeting all the requirements of nature and accepting certain of the opportunities.

Property division began in the sixteenth century, when grants were made by the king of Spain (Fig. 105). *Corrales* for stock raising were of circular form, 1 league in radius from a given center.<sup>1</sup> This system seemed natural and suitable at first. The

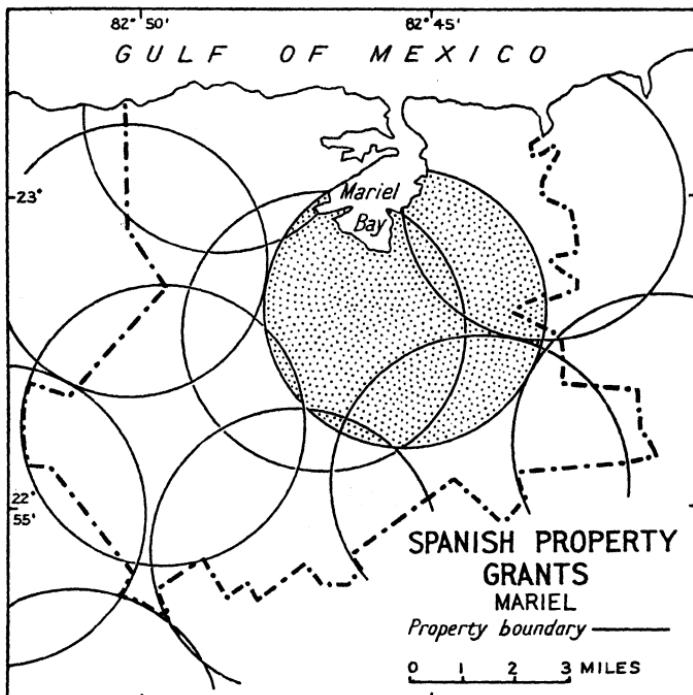


FIG. 105.—Early Colonial property division, in the time of livestock ranching. The new boundary of the modern sugar district is superimposed on the old pattern. The area of the first grant, now containing the town of Mariel and the Central San Ramón, is shaded.

**PROPERTY DIVISION.** In the development of the pattern, land tenure is fundamental. The property division of today is unsatisfactory in many respects and might be called unnatural and poorly adjusted. Yet various weaknesses in the present were natural arrangements in the past, and their acceptance and gradual modification now are more reasonable than their complete elimination.

country was empty and unknown; settlers were few and far between. The selection of a center was important, and the determination of boundaries unimportant. But when the country became populous the boundaries as well as the centers became important. The grants were faulty in location, difficult to survey, impossible to harmonize, and too large to be occupied as units, each having an area of

<sup>1</sup> F. J. VELÉZ, "Geografía médica-sanitaria del término municipal del Mariel," Habana, 1927.

18 square miles. Confusion resulted. Gradually property was divided up, and boundaries were fixed by compromise agreements.

When the sugar industry developed, the circles were divided into new

time the employment of free labor permits the effective working of smaller areas of land.

Accordingly, there has been a concentration of landownership in a few hands (Fig. 106). For instance, the

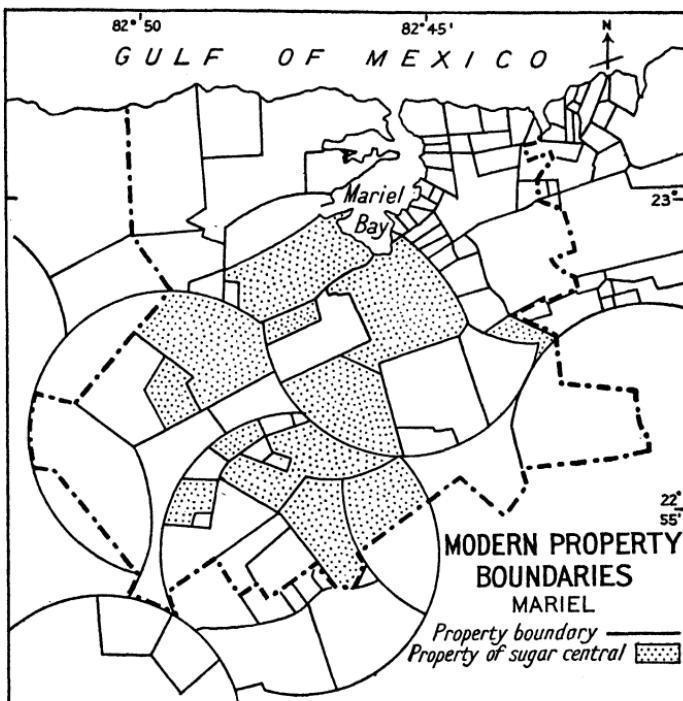


FIG. 106.—Subdivision of property, dating from the time of slave plantations; recent acquisition by the sugar central; and boundary of the district served by the central.

units—plantations based on the old property divisions but dimensioned to fit the new use of the area, located to contain several hundred acres of cane land, each plantation worked by slave gangs and served by its own sugar mill.

Now slave gangs have been superseded by free laborers, and small mills have been superseded by large centrals. These two changes have involved a readjustment of landholding in two opposite ways. A larger area of land is required by the central than by the small mills. At the same

owners of the Central San Ramón (a Cuban family controlling and managing the company) hold 40 per cent of the cane land of the district and have indirect control over the rest of the cane land. The Central San Ramón takes the cane from 16,000 acres, which formerly went to at least 17 plantation mills.

Simultaneously for farm operations the old plantations have been subdivided into small tracts and rented to tenant farmers. In the Mariel District 225 *colonos* produce cane, a majority

of them on less than 20 acres, a few of them on more than 200 acres (Fig. 107). Independent production is fostered by the central. The company maintains production on part of its own land and occasionally takes over other land from expediency rather than from choice.

per cent of the land is occupied by cane, five-sixths of it ready to harvest, in irregular fields fitting into the landscape. Workers' houses are distributed conveniently in the *colonias*, with fruit and vegetable patches near by.

**POPULATION.** Throughout the dis-

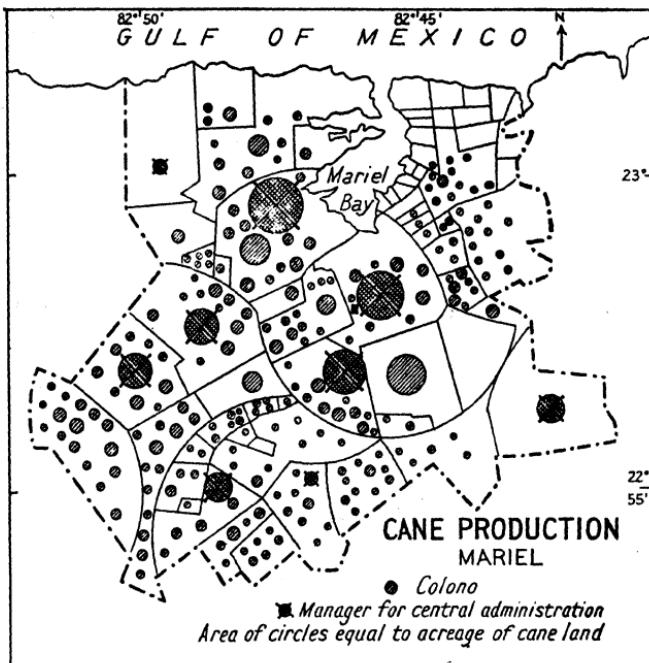


FIG. 107.—Cane acreage by *colonos*, the farm units of production.

Maps of one plantation, called the Finca Mariel, serve to illustrate details of land division (Fig. 108). The plantation is near the central and extends from swampland near the bay to an outlier of the escarpment. It has an area of 970 acres, formerly operated as a unit with its own mill. Now it is owned as a unit but divided among 12 producers, one of whom is a manager appointed by the central.

The *colonias* of the Finca Mariel are 10 to 450 acres in area, irregular in form, marked off by convenient but inconspicuous landmarks. Fifty-three

district, rural population is distributed near cane fields. Each laborer lives and works in a small area, averaging 8 acres of cane per man—small enough for considerable grouping of houses without taking workers far from their fields (Fig. 109).

The houses are simple structures, palm-thatched, well-suited to the climate (Fig. 110). They seem adapted even to the hurricanes that occur every three or four years on the average, for the relatively weak supports tend to give way and let the heavy roof sink to the ground and

form a shelter for the occupants during the storm.

The house groups are on knolls, at crossroads, or at centers of old plantations, with some advantages natural or accrued, such as water supply and stores.

**TRANSPORTATION.** The change from small mills to large central, drawing many little districts into one large district, brought the inevitable need of a new system of transportation, to carry the cane crop of 160,000 tons to the central, a much greater distance,

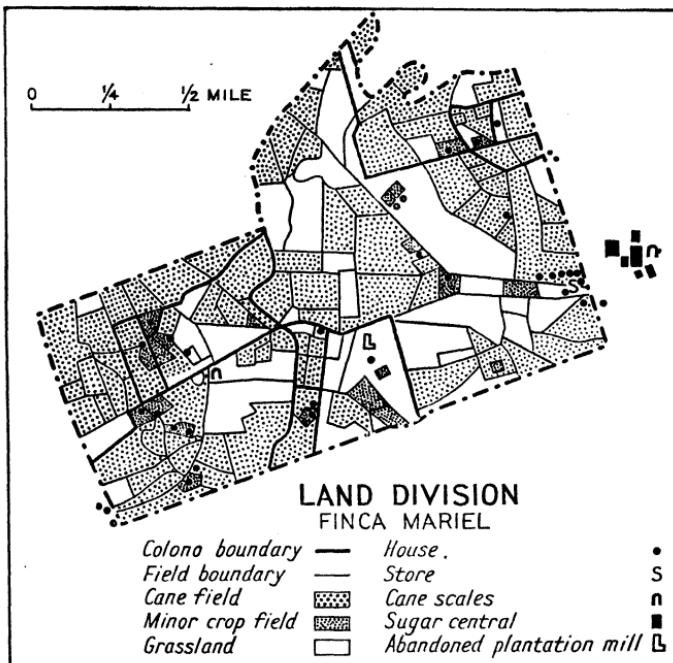


FIG. 108.—Fields, crops, and farm units, in one property unit. Located near center of Fig. 107.

Among the people are white settlers or their descendants as well as black descendants of slaves. Almost a thousand families are on the land, in accordance with the intensive requirements of cane production. Of the labor in the industry at least 90 per cent is in the fields and 10 per cent in the central, in contrast with the fact that of the capital invested in the industry hardly 10 per cent is in the fields and about ninety per cent is in the central. The central itself is well-designed to perform its function and is suitably located in the midst of its district (Figs. 111 and 112).

but just as quickly as to the old plantation mills.

The system of transportation is a vital feature of the pattern of land occupancy. A narrow-gauge railway reaches out from the central to the cane lands of the district and to the port (Fig. 113). Its function is not to supersede the old oxcarts but primarily to connect the plantations to the central. Oxcarts continue to be an efficient means of bringing in the crop from the fields; but, instead of delivering their load to the plantation mills, they take it to the near-by cane scales, which have replaced the mills on the plantations.

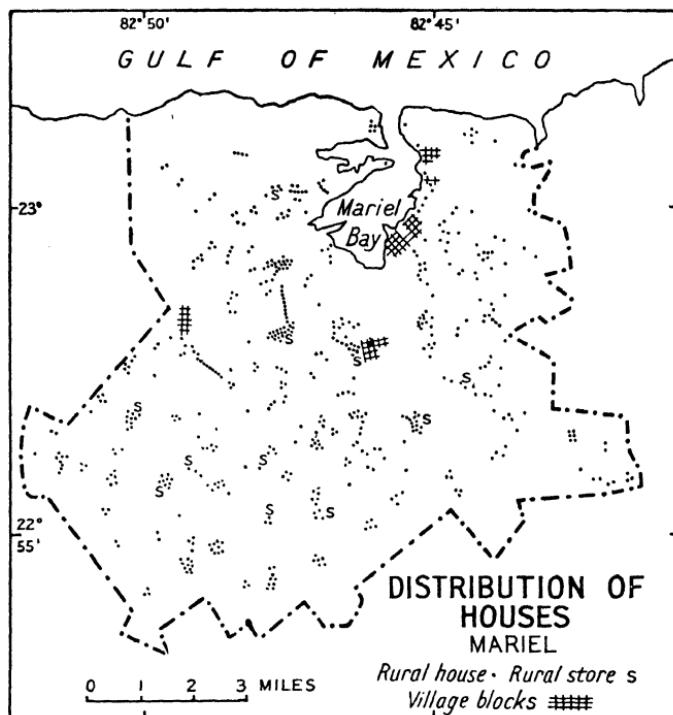


FIG. 109.—Distribution of settlement in the Mariel District.

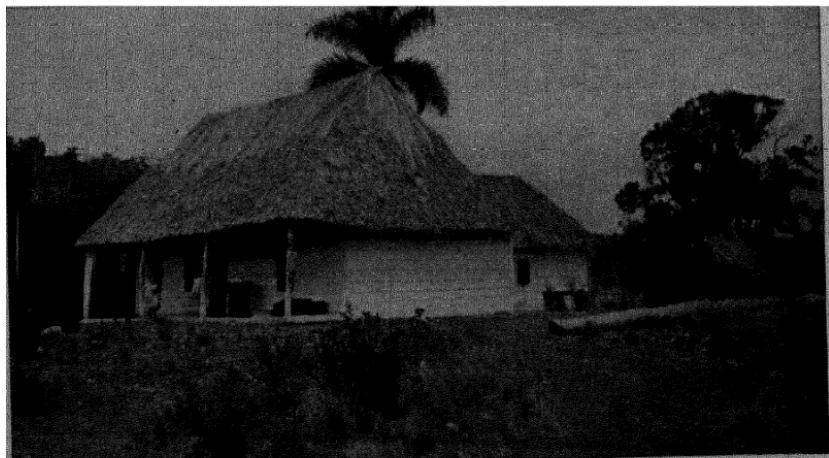


FIG. 110.—Rural house, Mariel District. Built of local materials; roof thatch of royal palm leaves and siding of royal palm trunks. Wooded escarpment slope in left background.

The system includes the cart roads giving access to every field and focusing on the cane scales. The roads of the

6 acres, and are separated by passageways for carts.

The cane of each *colono* goes regu-

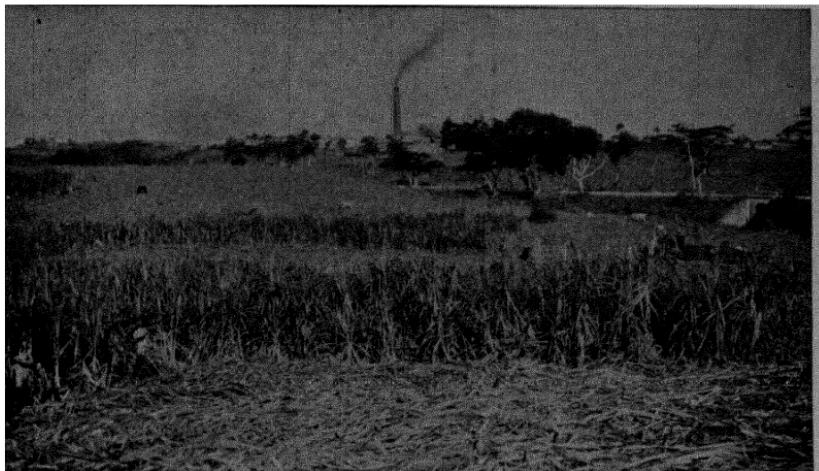


FIG. 111.—Central San Ramón and near-by cane fields. Highway at right. Harvest time; men cutting along edge of standing cane, cart loading cane at right, oxen grazing on striped leaves. View looking northwest.

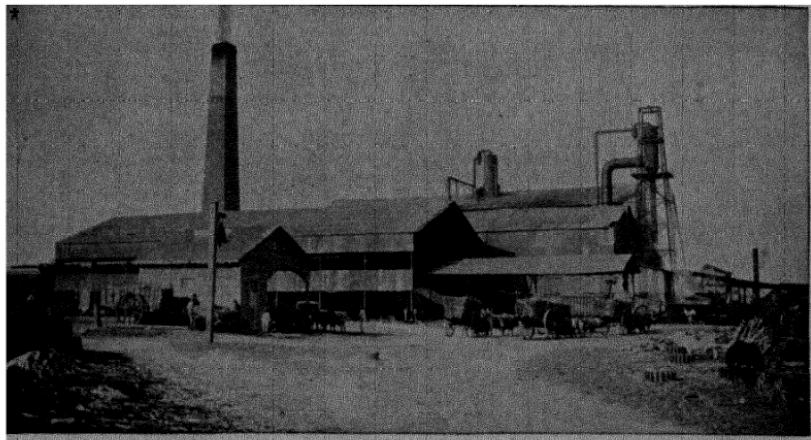


FIG. 112.—Central San Ramón. Oxcarts from near-by fields and railway car from more distant plantations approaching the incline where cane enters the mill.

Finca Mariel illustrate the arrangement (Fig. 114). The cane fields themselves are made small, averaging

larly to the most convenient scales. The traffic divides between scales, along *colonia* boundaries, are crossed

by few roads but by a single stream of traffic on the railway. At the scales, producers make delivery to the central, and the railway system is within the central organization.

of oxcart haulage, cane is brought down from the edge of the upland. Extension of the district southeast in the upland is favored by a motor highway permitting truck transportation

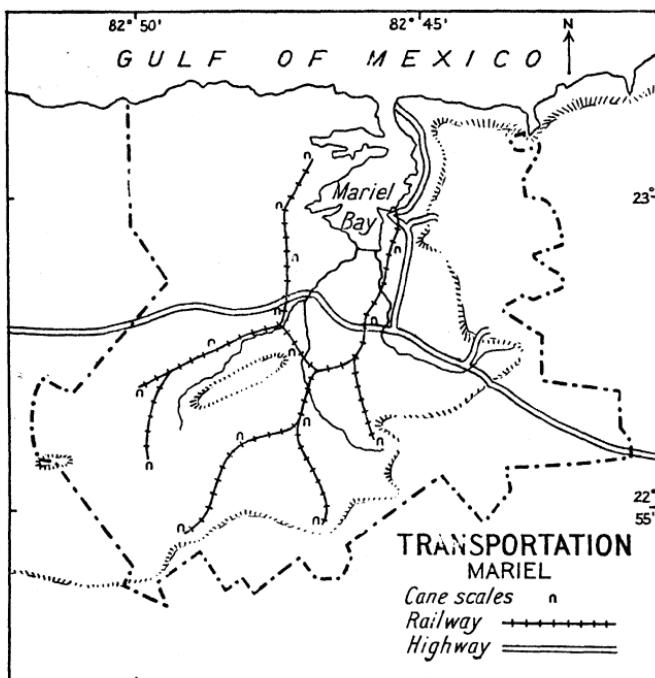


FIG. 113.—Transportation pattern of the Mariel District.

**FORM OF THE DISTRICT.** The Mariel District, precisely defined, is a modern unit of economic organization, and not a distinct area sharply limited in any other sense. Whereas the size of the district is related to the capacity of the central, the form and limits of the district are related to the layout and limitations of the railway, which is designed to reach available cane lands.

Good cane lands extend at a higher level south of the escarpment; but the railway seeks cane lands in the lowland and avoids the inconvenient ascent. Cart roads, however, ascend the escarpment; and, within the range

in place of railway transportation to the central (Fig. 113).

Thus the boundary of the district cuts across cane lands in the upland. Here is the divide between the flow of cane toward Mariel and that toward other centrals, south, east, and west.

The details of the boundary, depending on land control, follow the borders of old plantations, with lines and landmarks fixed in past history. The escarpment is a physiographic boundary; but for the topic under discussion the border of the district is the geographic boundary. The opposite sides of the boundary are similar in land

forms, soils, and climate, but different in location in a pattern of land occupancy.

**PATTERN IN MOTION.** The significance of location depends on motion:

The operations of planting and cultivating, spread through the year or through several years, are leisurely compared with the great effort of harvesting the crop. Even when unre-

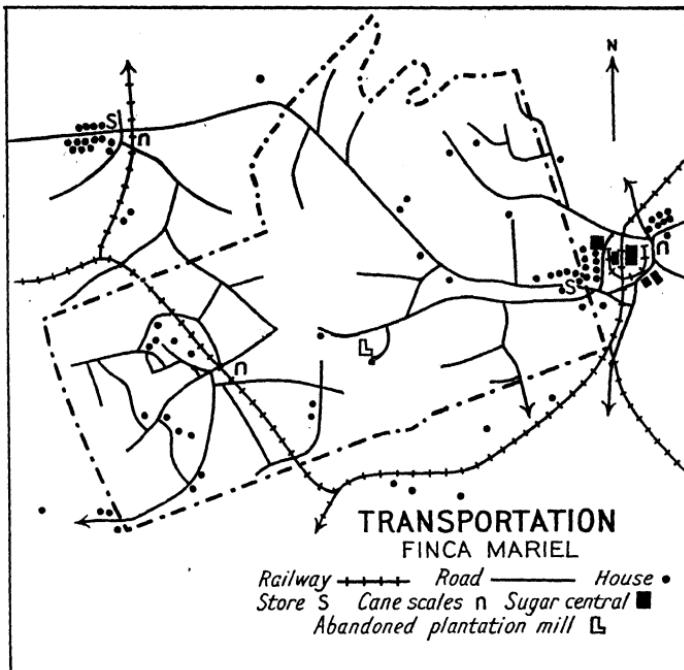


FIG. 114.—Detail of the transportation pattern, in one property unit.

the pattern moves, and in its dynamic as well as in its static form it harmonizes with the natural setting. The rhythm of the seasons impels the major movements. Temperature changes little from season to season, but rainfall divides the year into a rainy and a dry season.<sup>1</sup> Ground is prepared through the year for planting at the beginning or end of the rainy season (Fig. 115). The cane grows through the rainy months. On fields just harvested it springs up again through the old leaves.

stricted legally, the harvest is confined to a period of little more than a hundred days in the dry season from December to April. The harvest begins at the end of the rainy season when the sugar content of the cane has increased to a point at which milling is profitable, generally above 5 per cent. It ends at the beginning of the rainy season when the difficulties of field transportation are too costly to make harvesting profitable (Fig. 116).

The problem of harvesting northern hayfields is here multiplied manyfold,

<sup>1</sup> Mean temperature of the coolest month, January, 70°F.; of the warmest month, August, 80°F.; 40 inches of rainfall, 75 per cent of the mean annual total, during the half year from May to October. (*Ibid.*)

by reason of the vastly greater product per acre, far harder to cut and hauled far greater distances. Oxcarts cannot

they could serve all the fields economically at all times, their use in the rainy season would be confined to a



FIG. 115.—Tractor breaking sod of temporary pasture for cane planting, Mariel District.



FIG. 116.—Cane cart mired, in wet weather at the end of the dry season, Mariel District.  
In the background, cane scales, unloading oxcarts, and loading railway cars.

operate in the mud, and it is difficult to devise any other economical method of wet-weather transportation. Even if tractors were obtainable, so numerous, so powerful, and so cheap that

brief period before the decline of sugar content in the cane.

Harvesting in wet weather is complicated also by more rapid fermentation of cut cane, by greater injury to cane

roots, and by greater difficulties and discomforts for field labor.

Confined to a brief period, the 16,000 acres of cane of the Mariel District are cut at a rate of over a hundred acres a day, by more than a thousand workers each cutting  $1\frac{1}{4}$  tons daily. The cane is transported immediately by more than a thousand oxen drawing 250 carts, each taking daily two or three loads of 3 tons to the cane scales, to be carried on by 100 cars to the central.

For a hundred days or more, work at the central is continuous. Day and night every 10 minutes a carload is fed into the mill, or an oxcart load every 2 minutes.

The central is located to receive this inflow from the fields, and its location with reference to the outgoing product is less important—for only a fraction of the cane mass is transported away from the central. The water is boiled away; the crushed cane is burned for power and heat; a few cartloads of

solid refuse are carried away to near-by fields as fertilizer; a small amount of liquid refuse runs to waste in a near-by stream; two or three truckloads of alcohol are sent daily to Habana; and the sugar product, about 12 per cent of the cane weight, leaves the central at a rate of one car every  $1\frac{1}{4}$  hours, to be hauled to the port of Mariel and loaded, when ships come in, for export to the United States—17,000 tons a year, about one-half of 1 per cent of the sugar crop of Cuba.

The sugar industry forms only one part of the pattern of land occupancy at Mariel. Truck farming fits in with cane production. A fishing industry forms a distinctive pattern in the bay and streams and out in the Gulf. A great cement industry is concentrated in a little area of quarrying and manufacturing near the bay. A resort development extends along the shores, changing with the seasons. But these all belong to other aspects of the geography of Mariel.<sup>1</sup>

## 2. LÉOGANE<sup>2</sup>

### A COTTON FARM IN HAITI

Haiti is too extensive and complex to be comprehended at one glance. Yet a near view of one or two small spots will serve to introduce a larger area in one corner of the country, and some of the concepts apply beyond this one section to the country as a whole.

The corner of Haiti that is involved in this study might be considered the heart of the country, for it contains the national capital [Fig. 92(2)]. But Haiti has no core region so clearly marked as is the case with some other nations. Outside the capital city there is a considerable degree of rural homo-

geneity, or at least of homogeneous heterogeneity, and the vicinity of Port-au-Prince is not set apart from other sections of the country. If this were not so, the small rural areas under observation might not represent Haiti as well as they do.

The road from Port-au-Prince to Petit Goâve 40 miles to the west skirts the north shore of the southern peninsula. A bit of it stretches across an alluvial plain where irrigated fields of sugar cane extend along the tramways of a modern sugar mill. Another bit, near Petit Goâve, climbs up through

<sup>1</sup> Report of a field study of another aspect of occupancy near Mariel. MILDRED LESTINA, "Tobacco Plantations of the Vuelta Abajo District, Western Cuba," University of Chicago M.S. Thesis, 1937.

<sup>2</sup> Field work in March, 1933.

mountain foothills where valleys are green even in the dry season.

Elsewhere the road traverses low hill country and narrow coastal lowlands at the foot of the hills, all brown and dusty in the dry season. Even here a fairly dense rural population is in evidence—people coming and going

above the brook and the gulf to be well-drained.

The climate is a doubtful asset. The average temperature of every month is near 80°F. The average annual rainfall is about 45 inches, concentrated chiefly in the half year from April to September. There is an aver-

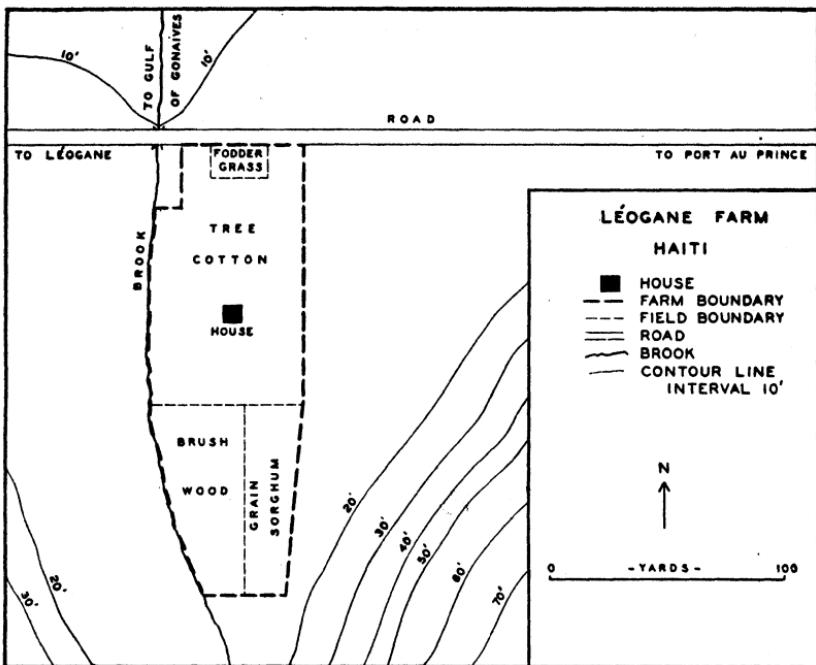


FIG. 117.—Land use in a cotton farm.

along the road and farmhouses in sight at every turn.

**FARM SITE.** One of these farms deserves attention—not because it is different from the others but because it seems to be like them. It is east of Léogane where the hills approach the shore and a brook from the hills crosses the narrow shore terrace (Fig. 117). The hills are of Eocene limestone, and the steep face overlooking the farm is probably a wave-cut cliff. The terrace has an alluvial mantle and is undulating and sufficiently elevated

age of at least 2 inches for every month even in the drier half from October to March; yet moisture is not in evidence at this season. The high average temperature can be depended upon, but the average rainfall cannot be.

**CROPS.** The farm has a strip of about two and a half acres on the shore terrace. In this little tract, cotton occupies about an acre and a half. In appearance, the tract is more like a dry thicket than an agricultural field—tree cotton, growing year after year without replanting, but pruned back

to within 1 foot of the ground every year and sending up woody shoots 8 or 10 feet long (Fig. 118).

The cotton crop is harvested twice a year and taken in bags to Léogane

The third patch of ground, occupied by bushes and grass, is hardly to be called pasture; for there are no fences, and apparently the animals graze more in the cottonfields and grainfields than



FIG. 118.—In front of the house, Léogane Farm. Boy pounding grain sorghum in mortar. Cotton bushes ready for harvest in the background. View looking north toward the gulf.

or Port-au-Prince to be sold. It is irregular in quality, stained, and dirty but is marketable for export, offering a convenient opportunity for cash income.

Another drought-resistant crop occupies a half acre, petit mil, a grain sorghum. This affords the chief food supply for the family. The grain is pulverized in a mortar and made into bread (Fig. 118).

here. Near the road there is one small patch of planted grass for fodder. The livestock includes one donkey, two goats, and several chickens.

**FARMSTEAD.** The only building is a one-room hut in the midst of the field, a light wattle structure with thatched roof and dirt floor.

The family consists of a father and mother with five children—Negroes,

barefooted (except for one pair of boots), dressed in cotton garments with hardly enough to go around, speaking the Haitian variety of French, suspicious of and unfamiliar with strangers.

Here life is reduced almost to its simplest terms for people and live-

stock, with semiwild crops and slight provision of shelter and clothing. But inadvertently the farm has a place in the trade of the world, by a certain coincidence of Haitian land and people. Before commenting on this coincidence, let us consider another spot in the rural pattern of occupancy.

### 3. PÉTIONVILLE<sup>1</sup>

#### A COFFEE FARM IN HAITI

Southeast of Port-au-Prince the road to Kenscoff climbs up from the bushy hills of the gulf shore toward the Morne la Selle [Fig. 92(3)]. At an

earlier and a drier season during the other half of the year is like that of the coast, although the dry period is shorter and more pronounced. The slopes are some-

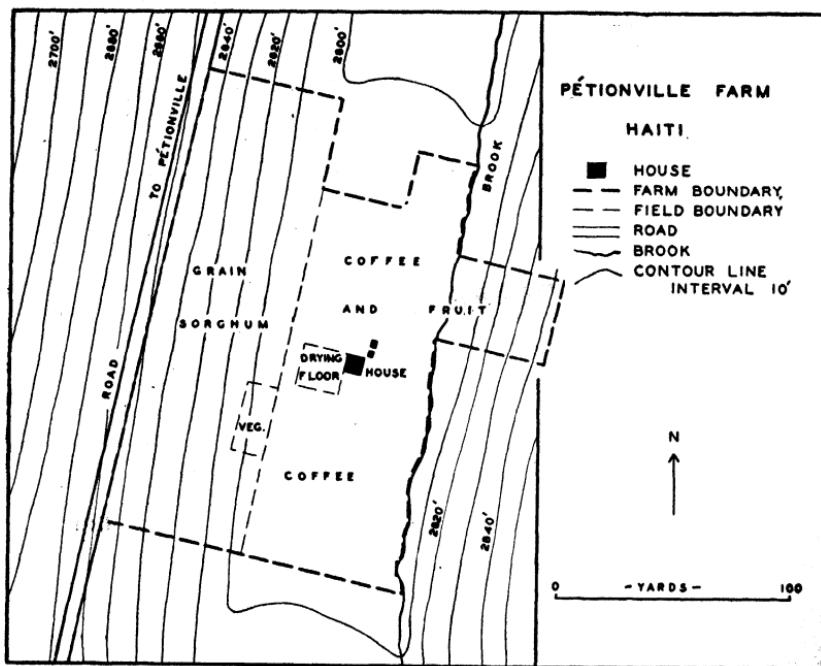


FIG. 119.—Land use in a coffee farm. Contours smoothly sketched.

elevation of 2,500 feet, temperatures are lower than at Léogâne, averaging about  $70^{\circ}\text{F}$ . for every month, and rainfall is heavier, averaging about 52 inches annually. The division into a rainier season from April to Septem-

what brown in the dry season; but in the valleys trees and bushes are green, and growth is fairly luxuriant.

**FARM SITE.** A few miles south of Pétionville is a small farm worthy of consideration as representative of

<sup>1</sup> Field work in March, 1933.

its district (Fig. 119). It is in a narrow valley and occupies a strip of the valley bottom and a bit of the steep lower slope on each side. A brook flows in the valley northward toward the Cul de Sac plain. The gradient is steep, but the alluvial floor is smooth, well-drained, and fairly fertile, with

Harvest is in the dry season, mainly in January. The crop is picked by stripping the branches without careful attention to distinguishing the ripe from the unripe berries. Treatment is by the simple but satisfactory dry method, first spreading the berries on the drying floor and later removing the

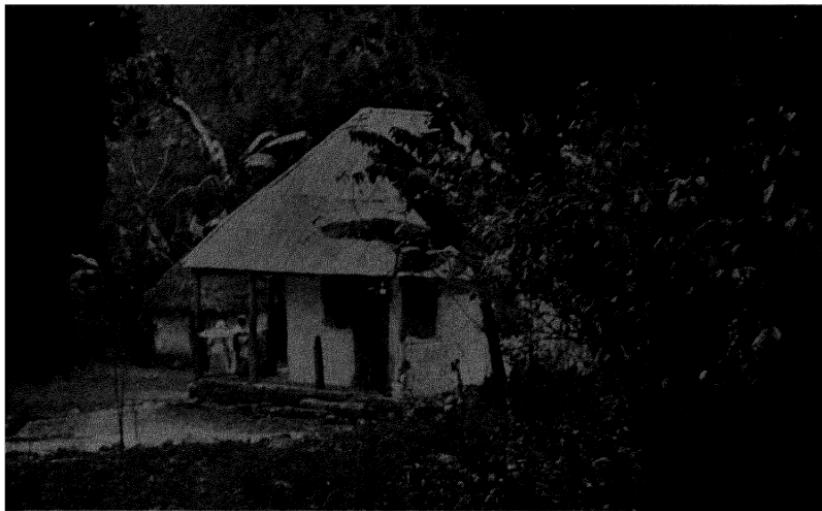


FIG. 120.—House of the Pétionville Farm. Coffee bushes in right foreground. Drying floor at left beside house. Dense vegetation on valley slope in the background.

light soil. The underlying rock is Eocene limestone.

**CROPS.** The farm area is about four and a half acres. The valley flat is covered by a dense growth of trees and bushes—two or three giant morabín trees spreading their branches high above the ground, below these a mixed stand of fruit trees, among which oranges and plantains are conspicuous, and still lower an undergrowth of coffee bushes throughout. Shade trees and coffee bushes grow also on the steep east slope of the valley. The grove has the semblance of a thicket quite as much as does the cotton field of the lowland, although here it is a green and shady thicket (Fig. 120). The coffee has been planted but is a perennial receiving little care.

dried pulp by mashing in a mortar and washing and drying the beans. Annually about two sacks are taken to Pétionville to be sold and exported.

The west slope of the farm is occupied by petit mil, the chief supply crop. A patch of vegetables adds to the food supply, and the menu is completed with plantains, oranges, and eggs. The household livestock consists of two pigs and four chickens.

**FARMSTEAD.** The house is superior to that of the cotton farm, having two rooms and a porch, a stone foundation and floor, whitewashed stucco walls, and a galvanized iron roof (Fig. 120). There are also two separate sheds with thatched roofs.

The family consists of a father and mother with three children. They are

Negroes, barefooted and cotton-clad, suspicious of strangers, but fairly intelligent and self-respecting, with some pride in their family connections up and down the valley. Here, too, life is simple, with semiwild crops and slight provision of shelter and clothing. Yet this farm also has an entree to world trade, but with a different ticket of admission. This situation deserves comment.

**BACKGROUND.** Haiti became great as a sugar colony in the eighteenth century—the greatest in the world. With the collapse of the French regime, sugar all but disappeared and has barely reappeared since the United States entered the scene. Meanwhile, the plantation population increased and spread over the land, finding easy subsistence and several commercial products other than sugar. Thus sugar, the plantation crop of large-scale

organization, cultivation, and processing, gave way to crops of small-scale handling, little or no cultivation, and simple processing. Coffee is the leading export of Haiti, and cotton is second. At the same time, the total amount of exportation is small; subsistence and low productivity per capita are more characteristic than commercial activity.

From one point of view, Haiti is fortunate in enjoying conditions favorable both for subsistence and for several commercial alternatives. From another point of view, Haiti is unfortunate in the conditions that invited the development of slave plantations in Colonial days and that now invite enough contacts with the world of trade and of great nations to cause friction but not enough to produce clear understanding.

#### 4. WEST INDIAN TRAVERSE

##### a. DOMINICAN REPUBLIC<sup>1</sup>

The Dominican Republic, as seen from the air, contains most of the variety of landscape features characteristic of Caribbean countries: rugged mountains and smooth plains, brown desert and green forest, primitive clearings and mechanized plantations. The main air route of the island traverses the southern part of the Dominican Republic from end to end, missing the area of greatest rainfall on the northeast slope, and passing from semiaridity in the southwest to moderate rainfall in the southeast [Fig. 92(4)].

**CUL DE SAC.** Starting from Port-au-Prince, Haiti, the route follows the Cul de Sac plain to the east. For air transport this is no cul-de-sac, but an unobstructed lowland passage between parallel mountain ranges, 100 miles long from the main waterfront of

Haiti to that of Santo Domingo. But from the viewpoint of settlement and resources it may well be considered a cul-de-sac, in which people have penetrated from the coast and have found only an uninviting interior area. The interior desert has served as an obstruction between coastal settlements at opposite ends of the lowland and has remained as a sparsely populated outlying district, through which the boundary between Haiti and the Dominican Republic has been drawn.

At the Haitian end of the lowland, close to Port-au-Prince, is the systematic pattern of a modern sugar plantation, with several thousand acres of cane and a large central mill. Eastward toward the interior there is a rapid transition to barren land and sparse occupancy. The aspect of desolation is pronounced in the vicinity of the

<sup>1</sup> Field work in January, 1922 (ground), and September, 1935 (air).

international boundary (Fig. 121). Xerophytic bush vegetation is scattered over lowlands, foothills, and mountain slopes. Depressions in the plain are occupied by lakes, of which the largest is a shrunken salty sheet of water bordered by alkali deposits, 8 feet below sea level.

at the Haitian end. Here are not only numerous small farms and villages but also a large modern sugar plantation, occupying the largest alluvial fan and receiving water for irrigation from the largest stream that anywhere enters the lowland.

**SOUTH COAST.** Having reached the

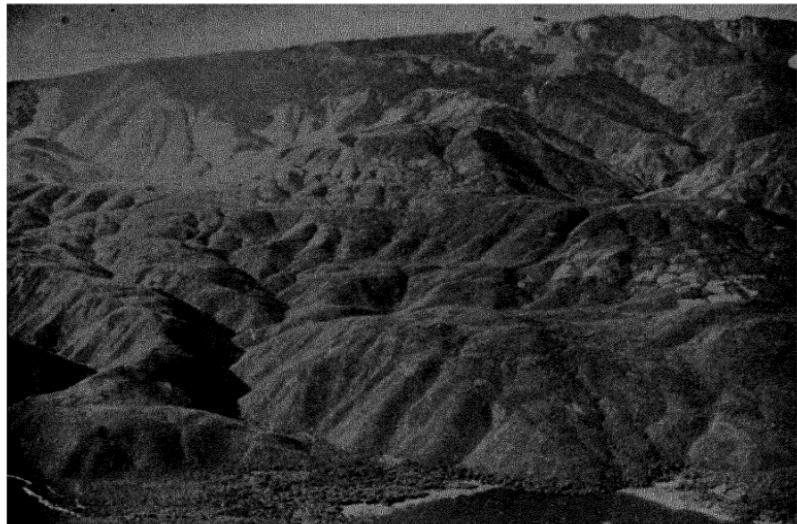


FIG. 121.—Mountain wall bordering the Cul de Sac plain. Dry bushy slopes; shore of lake (*Etang Saumâtre*) in the foreground; alluvial-fan fields in lower right; ridge fields above. Air view looking southeast, Haiti at right, boundary of the Dominican Republic at upper left.

But the area is not entirely deserted even at the boundary between countries. Along the sides of the plain, at the foot and on the slopes of the bordering ranges, there are small clusters of cultivated fields and houses, on alluvial fans and low spurs, similar in appearance and no less numerous on the Dominican than on the Haitian side of the boundary. Probably, all along the route, human activity is more extensive than appears from the air.

Conspicuous and highly developed occupancy appears again at the Dominican end of the plain much like that

Dominican coast the air route continues eastward along the southern shore of the island, touching headlands and crossing bays. For 50 miles the route continues in the lee of high ranges, and marks of semiaridity prevail on bare ridges and bushy plains. Lagoons where salt is made by evaporation are conspicuous at two points on the shore. Farm fields are inconspicuous but fairly numerous on small alluvial plains.

The last part of the route, for a distance of 100 miles, to the eastern end of the island, traverses a continuous lowland, the largest in the country.

The land surface is dissected by small streams and is characterized by low hills and alluvial plains, semideciduous tropical forest, and numerous areas of settlement. Close rural occupancy is in

streams large enough to be called "rios"; two villages; one estate having a grove of coffee on valley slopes and small plantings of bananas and cacao; a score of small subsistence



FIG. 122.—New clearing in forest, made by felling and burning, for temporary cropping. Corn sprouting. House frame not yet thatched, in the background. In upland west of Ciudad Trujillo, on the road traverse route.

evidence, particularly in the western part of the lowland, within a 30-mile radius of the national capital, Ciudad Trujillo, which occupies a river-mouth site on the lowland shore (Fig. 96).

**LAND TRAVERSE.** A supplementary traverse of 20 miles by road west of Ciudad Trujillo gives a closer view of hills and valleys partly forested and partly cleared. Even in the dry season the landscape is green and shows no signs of drought. The forest is a mixed growth in which a few boughs are bare of leaves. There are some large trees, particularly along streams; but most of the vegetation is of small trees and bushes, apparently second growth. Brown residual soil covers the hills. In a few places, limestone outcrops.

In the 20-mile road distance there are two valleys with flood plains and

farms in hilly uplands between valleys; and innumerable scrub cattle in bushy pastures fenced with barbed wire. The hill farms among woods and thickets show signs of primitive shifting cropping, particularly in a few new clearings where crops of corn, beans, and bananas are growing up among the charred remains of fallen trees (Fig. 122).

**SOUTHEAST COAST.** The air route continues eastward from Ciudad Trujillo and passes the most highly developed commercial farming district of the country in the east central part of the lowland area. Here are fewer small farms on wooded hills and more large plantations on extensive alluvial plains (Fig. 123). Sugar cane occupies most of the fields, and modern sugar

mills are numerous. Cotton occupies a few fields, probably as a substitute during sugar-market depression. Most of the plantations are along streams,

are not lacking even in this district, around and beyond the plantations. But at the eastern end of the lowland both small farms and plantations are



FIG. 123.—Sugar mill and cane fields on alluvial plain of Rio Macoris. Air view looking northeast.

but probably for reasons of alluvial soil as much as for water supply; irrigation is commonly though not necessarily used.

Small farm clearings in the woods

lacking over an unbroken wooded plain extending to the shore of the island, probably an area of uplifted reef where exposed rock predominates over arable soil.

#### b. PUERTO RICO AND JAMAICA<sup>1</sup>

It is unusual to find two places so much alike by nature as Puerto Rico and Jamaica (Fig. 92). One general description will serve for both.

**SIMILARITIES.** Each is an island in about 18°N. latitude, strategically located with respect to each of the northern passages of the Caribbean. The area of each is a little less than that of the state of Delaware. In each the longer axis is east and west, and there is a mountain backbone extending through the length of the island. The surface is rugged and intricately dissected, and the only considerable flat areas are small valley lowlands near the coast. In the mountain back-

bone, igneous rocks are exposed, and elsewhere limestone prevails. Soils derived from both types of rock are generally heavy, and reddish-brown colors predominate.

Temperature changes from season to season are slight. At low elevations, days are hot and nights are cool the year around; up in the mountains, the range of temperature is lower, but there is no place where frost occurs. Winds blow prevailingly from north and east—the trade winds. The relation of topographic features to these winds is an important factor in rainfall distribution. On the mountain slopes in the northeastern parts of the islands,

<sup>1</sup> Field work in January, 1922. R. S. PLATT, Porto Rico and Jamaica, *Journal of Geography*, Vol. 22 (1923), pp. 132-137.

the annual rainfall is more than 100 inches, and there is no marked dry season. Tree ferns and other "hot-house" plants flourish. Elsewhere in the mountains, and along the north and east shores, the annual amount of rain is less, and there is a season of relatively little rainfall from December

on account of historical accidents rather than on account of the direct influence of environment.

Jamaica is a British colony with a dense population of English-speaking Negroes. Puerto Rico is an American dependency with a still denser mixed population of Spanish-speaking people.

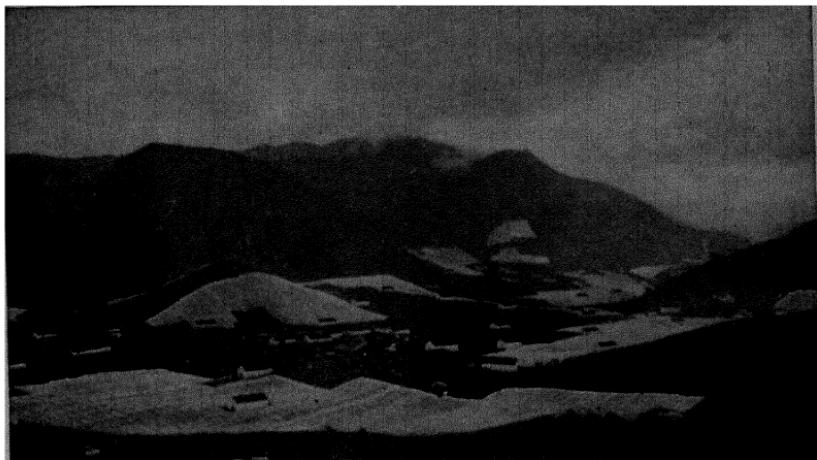


FIG. 124.—North coast of Puerto Rico, near the western end of the island. A coastal-plain area of sugar-cane production; pattern of fields almost to the water's edge; coconut palms along shore and a short distance inland at right; town in the center. Air view looking south, September, 1935.

to April. But, even in this season, showers are frequent, and vegetation is green all the year. On the south and west slopes the annual amount in general is less than 50 inches, and there is a marked dry season for about half the year. During this season the land is dusty and brown, trees lose their leaves, and almost the only green things are xerophytic plants, such as cacti, and irrigated crops.

**DIFFERENCES.** In spite of the similarity of the two islands in respect to natural conditions, there is a striking dissimilarity in development, due to human elements that are in contrast

In Puerto Rico, fertile valley and coastal lowlands are occupied by sugar estates that fringe the island like a scalloped border (Fig. 124). In each valley is a green expanse of cane, with the tall chimney and the red tin roofs of a modern central in the midst. Sugar is the chief export of the island. On lands of the same type in Jamaica, bananas are the chief crop. This fruit, which does not figure at all in the trade of Puerto Rico, forms the principal item of export from Jamaica. Sugar cane is of secondary importance in Jamaica, and a considerable proportion of the crop is used to make rum instead of sugar.



sheds, a development localized in this interior area, valley of Caguas, Puerto Rico. On the steeper slopes above the valley, in the background, are numerous small open fields, growing filler tobacco.

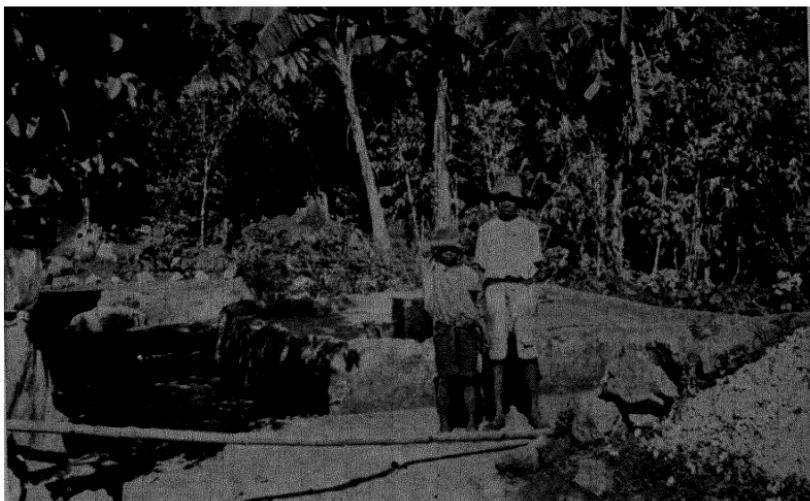


FIG. 126.—Drying floor and garden patch, containing coffee, annatto, plantain, and sugar cane, a Jamaican bush farm.

The mountain slopes of the interior of Puerto Rico for the most part are bare of forests. Some patches that have the aspect of woods are coffee groves, and coffee is the chief crop of the interior. Highly cultivated land is conspicuous. Tobacco is grown as a

has a dense population of English-speaking Negroes, and as a result of Spanish settlement and a smaller amount of plantation development Puerto Rico has a dense population of Spanish-speaking white people with a minor mixture of colored blood. The

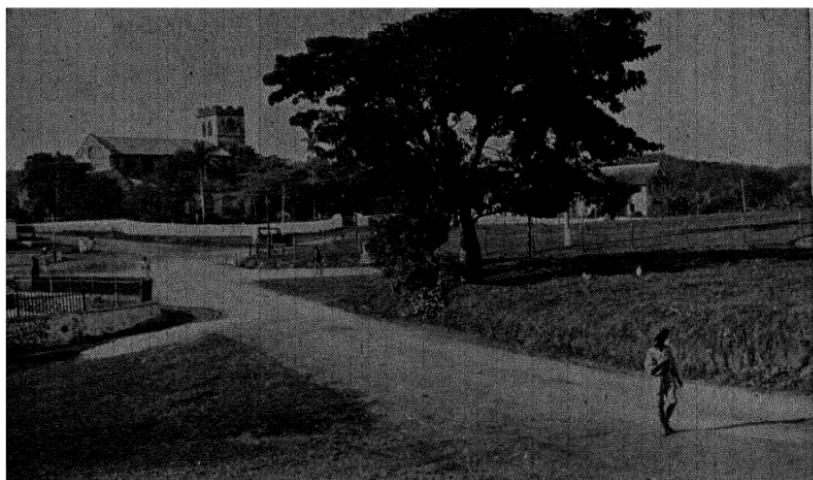


FIG. 127.—Village green, Mandeville, interior uplands, Jamaica. Views reminiscent of English countrysides are less common than bush farms.

commercial crop even on very steep slopes, and in some valleys acres of land are covered with cheesecloth—sunshades under which wrapper tobacco grows (Fig. 125). In Jamaica, on the contrary, there is more forest land. Instead of coffee groves and tobacco fields, there are "ruinate" estates and patches devoted chiefly to subsistence farming, each with a clump of fruit trees and a patch of root crops (Fig. 126). In some places there are special commercial crops grown on a very small scale, ginger, allspice, and annatto.

**BACKGROUND.** The basis of these contrasts is found in political ties, past and present. Jamaica is a British colony (Fig. 127). Puerto Rico was a Spanish colony and is now an American territory. As a result of British plantation development in the past, Jamaica

lowland plantations of both islands were devoted to sugar production in former times, but in modern times the sugar of Jamaica has been nearly driven from the market by British free trade and the American tariff, whereas Puerto Rico as a part of the United States has access without tariff to the greatest sugar market in the world.

In Puerto Rico the banana could not compete with sugar, but in Jamaica this crop has taken the place left vacant by the decline of sugar. The rugged interior of Jamaica has been less developed, whereas the interior of Puerto Rico has more coffee groves as a result of Spanish encouragement and tobacco fields as a result of American enterprise.

The contrast is greater than that shown by a statement of products.

Jamaica, with its Negro population long under British rule, is different from

Puerto Rico, with its mixed population, touched by new American activity.<sup>1</sup>

## 5. MARTINIQUE<sup>2</sup>

### A VOLCANIC ISLET

Martinique is in the midst of the curving chain of islands at the eastern end of the Caribbean Sea [Fig. 92(5)]. From its shores, other links in the chain are visible to north and south, all similar in their general aspect, volcanic mountains more or less symmetrical in form, rising from the sea. Martinique is larger than most of the other islands; yet from a single mountain peak it is viewed from end to end, and the sea is visible in the distance on every side.

**LANDSCAPE.** Three mountain masses form the bulk of the island, their slopes being steep on the west, but shelving off on the east in a rolling lowland several miles broad. The central mountain mass, Carbet, surrounded by a group of rocky pinnacles, is separated from the lower southern mass by a lowland gap and a broad bay. On this bay is situated the capital and commercial port, Fort-de-France. Carbet is separated from the northern mass, Mt. Pelée, by a narrow valley, near the mouth of which is St. Pierre.

The northeast trades blow constantly over the island, and the black beaches and headlands of the eastern coast are pounded constantly by the white surf. The mountain peaks generally are hidden by low-lying clouds, and their slopes are drenched by passing showers. This is the climate of rainbows. The warm moist air on these mountain slopes gives the impression of a hothouse, and this impression is increased by the vegetation—every-

where a profusion of green shrubbery among which the lacy leaves of tree ferns and the broad leaves of wild plantains are conspicuous. The growth is not that of a forest but of an overgrown evergreen garden. From a distance, mountain slopes look as if clothed in velvet.

**OCCUPANCE.** On the lower slopes and rolling lands to the east are many pastures in which cattle graze; and in little lowlands are fields of sugar cane. In valleys near the coast are sugar mills and rum distilleries, surrounded by light green fields of growing cane or red-brown fields newly plowed. Sugar and rum for the mother country, France, are the chief commercial products. Crops other than cane are not much in evidence—a few pineapples, a few lime trees, and household food crops in small dooryard patches, cassava, dasheen, sweet potatoes, and clustered groups of banana, mango, and breadfruit trees.

There is a mansion on each sugar estate (Fig. 128), and neat thatched cottages are scattered along the road and grouped in numerous villages.

The land is crowded with people, Negroes, speaking French. They are poor and thriftless, lighthearted, friendly, and picturesque. Women are more conspicuous than men, dressed in bright-colored calicoes with flowing trains and red turbans. Gangs of them may be seen cutting cane in the fields, and on the roads streams of them striding along with trays of market

<sup>1</sup> Reports of detailed field studies in Puerto Rico and Jamaica: MARGUERITE UTTLEY, "Land Utilization in the Canóvanas Sugar District, Puerto Rico," Ph.D. Thesis, 1937, and FREEMAN A. KOEHLER, "Blue Mountain Coffee District, Jamaica," M.S. Thesis, 1940, University of Chicago.

<sup>2</sup> Field work in February, 1922. R. S. PLATT, Martinique, *Journal of Geography*, Vol. 22 (1923), pp. 137-139.

produce balanced on their heads (Fig. 129).

The most animated spot in the

is the market place in the unsubstantial village of shacks that has grown up among the ruins of the city of St.

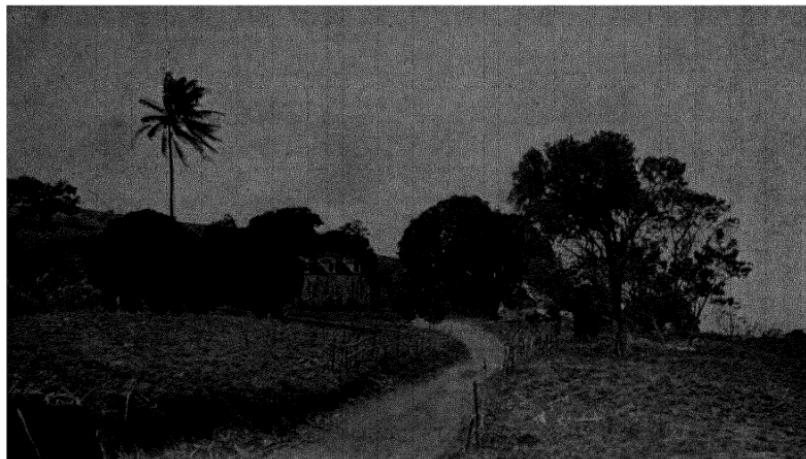


FIG. 128.—House and fields of a sugar estate, eastern slope of Martinique.



FIG. 129.—People on the road to market; fishing boats and nets in the background; east coast of Martinique.

island is the market place in the substantial city of Fort-de-France, with its bright-colored buildings and lively crowds. The most pitiful spot

Pierre, overwhelmed in 1902 by the eruption of Mt. Pelée. St. Pierre lies abandoned as a city—not because people are afraid of the volcano, but

because the place is unessential in a small island having another and better port already developed. Therefore, city functions are well-concen-

trated in Fort-de-France, and the ruined St. Pierre is used appropriately as a local village center in a rural community.

## 6. CURAÇAO<sup>1</sup>

### A LIMESTONE ISLET

Curaçao is known as an entrepôt and as a liqueur. Beyond these two concepts common knowledge is lacking, although there are other facts to be known about the island. Indeed,

before enter and clear from its harbor; and it boasts the largest oil refinery in the world as a recent embellishment (Fig. 130). These facts reflect the recent growth of the mainland service

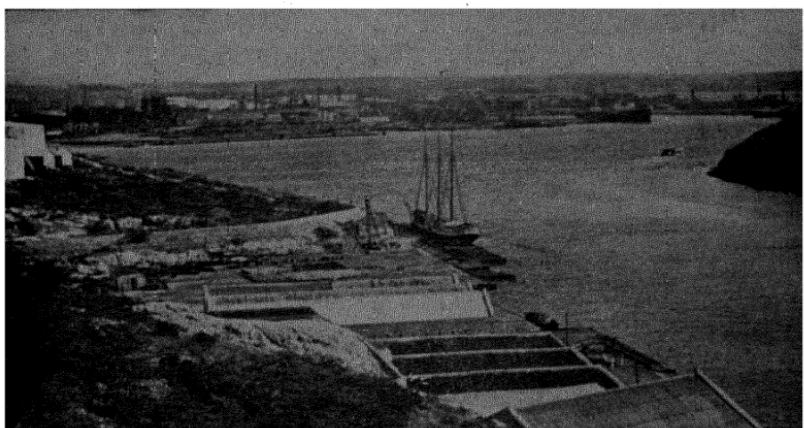


FIG. 130.—Inland end of the harbor channel, Willemstad, Curaçao. In the background, the Shell petroleum refinery, landlocked and not visible from the open sea. Canuco Mo Li Po is somewhere near the sky line on the extreme right. View looking northeast.

the liqueur is only a matter of history touching the origin of a product now manufactured elsewhere; and the entrepôt occupies less than 1 per cent of the island area.

**PORT CITY.** Before turning to the other 99 per cent of the land, we should not dismiss the 1 per cent entrepôt too lightly, for it is the most important spot in the island [Fig. 92(6)]. Unlike many entrepôts elsewhere, Willemstad has not declined in modern times. More and larger ships than ever

area of this island port. In a certain sense, it is not an entrepôt but a regular seaport serving the Maracaibo basin in much the same way that a river-mouth port may serve its valley. The port of Willemstad is the only city of Curacao, and about half the people of the island live in it.

The other half who do not live in Willemstad are scattered over the other 99 per cent of the land, at an average density of 100 to the square mile. It is with this other half of the

<sup>1</sup> Field work in February, 1933. R. S. PLATT, A Curaçao Farmstead, *Journal of Geography*, Vol. 35 (1936), pp. 154-156.

population and their land that we are concerned—or at least with a few of them in a typical spot.

SUBSISTENCE FARM. The Canuco Mo Li Po is about eight miles northeast

Grain sorghum occupies most of the acre of smooth cultivated land, a drought-resistant crop planted at the beginning of the rainy season in October, cultivated in November and

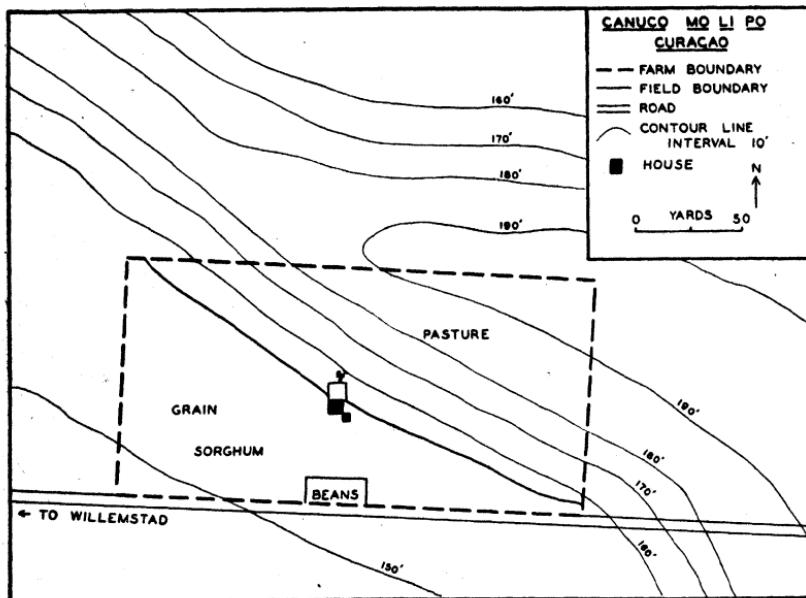


FIG. 131.—Field and pasture of a Curaçao farm.

of Willemstad, midway between the north and south shores of the island. Both shores are visible over a rolling landscape from a hilltop 190 feet above the sea on the northern boundary of the property. The place is a farm of 1 hectare (2.47 acres), of which half is on the hillside sloping at about 12 degrees and half is on the gentler slope of a hollow at the foot of the hill (Fig. 131). The soil is residual, light, and well-drained.

The time of observation is in March at the beginning of 8 months of drought after a rainy season of 4 months (with an average seasonal precipitation of 14 inches, two-thirds of the annual total). Already the landscape is brown and dusty, like a dry August in the Corn Belt. Harvest time is approaching.

December, and maturing in March. This cereal is the main supply crop, forming the staple food of the people. A patch of beans provides a supplementary item of diet; and there are a few squash vines in the grainfield.

The other half of the *canuco* is unimproved hillside pasture. The grass is never luxuriant and is dry during two-thirds of the year, but with a supplementary supply of sorghum leaves and other incidental fodder 10 goats are supported here. The household livestock includes also 20 pigs, 10 chickens, and a dog.

There is no money crop, but occasionally there is a goatskin to sell, or a few eggs, a chicken, or a pig, to furnish needed cash.

In the center of the *canuco* is a frame cottage with a suggestion of the Netherlands in its architecture (Fig. 132). It has one room in the main part and a kitchen in a separate shed.

unworried and unaspiring, typical natives of the Curacao countryside.

This island is not unlike Cuba in its elongated form, its rolling surface, and its array of sheltered harbors, but is



FIG. 132.—A Curaçao farmstead, Canuco Mo Li Po. Grain sorghum in right foreground. View looking northeast, at front of house.

Outside are goat corral and chicken coop.

The people who own and occupy the *canuco* are a family of four, man and wife and two children. They are Negroes, speaking only Papiamento, leading a poor but not a hard life,

entirely unlike Cuba in size and in development—its farms not producing for export, its harbors not used as ports for the land behind them, its only city drawing its life from another land and hardly conscious of the other half of its fellow countrymen.<sup>1</sup>

## 7. BERMUDA<sup>2</sup>

### OCEANIC ISLETS

The Bermudas are a unique group of islands: minute, bizarre, remarkable [Fig. 92(7)]. They have been called

"Islands of Devils," "Garden of

<sup>1</sup> Reports of field studies on limestone islets in the Bahama group: WILLIAM C. STEAGALL, "Little Exuma, Bahama Islands: Pattern of Farm Occupance," 1936; DELMAS A. BUGELLI, "Mangrove Cay, Bahamas—Land and Water Occupance," 1938; and IRMA A. BUELL, "Port of Nassau," 1940; University of Chicago M.S. Theses.

<sup>2</sup> Field work in March, September, and October, 1919. R. S. PLATT, Resources and Economic Interests of the Bermudas, *University of Chicago Abstracts of Theses, Science Series*, Vol. 5 (1926-1927), pp. 325-330.

Bermuda is outside the conventional limits of Latin America but is so closely associated with the West Indies, and particularly with this series of Latin American studies, as to justify inclusion here.

Eden," "Gibraltar of the Atlantic," "Market Garden of New York"—epithets suggesting aspects of a many-sided character. The group is isolated and is surrounded by dangerous reefs; yet ships flock to its harbors. The

world and tried to form a self-sufficient community. But rapidly the difficulties of self-sufficiency appeared, and gradually the community began to reap the benefit of its place in the world. Now relations with other parts of the world

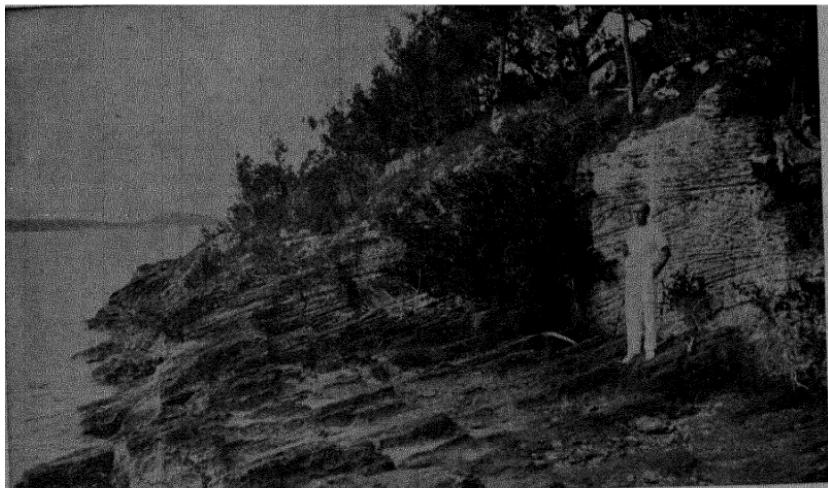


FIG. 133.—Old limestone quarry on the southeast shore of Soncy Peninsula; weathered since abandonment, exposing cross-bedding of dune structure. Cedar woods above the quarry. View looking southwest.

islands are diminutive in size, and much of the land is unproductive; yet the inhabitants number more than 20,000, more than 1,000 per square mile.

The purpose of this study is to investigate the basis for the population and for the activities of Bermudian life.

The islands were uninhabited when discovered about 1510. Thereafter they were shunned by seamen for a hundred years as desolate and dangerous rocks. Then, as a result of the experiences of a shipwrecked party, they gained credit as a habitable place and were settled by English colonists.

**SUBSISTENCE.** The first settlers came to found homes and to make a living by what they could produce from the land. For some years they were almost cut off from the rest of the

are paramount, and the production of commodities for home supply is quite insignificant.

Only a few needs are provided for by local products, and none of these products is conspicuous except as it is peculiar. Among these products are shell-sand rock, of which the islands are composed (Fig. 133), sawed into blocks and roofing slabs to build almost all Bermudian houses; palmetto leaves for small fiber articles; cedarwood for fuel; rain water collected on whitewashed hillsides and stone roofs; fish caught on the reefs in sufficient quantity to supply the local market; and secondary products of agriculture.

**FARMING.** The principal productive activity is agriculture, producing commodities for export rather than for local supply. Food products are the

chief imports of the islands, and at the same time food products are the chief exports. The special character of Bermudian production is at the root of this trade. The distinctive Bermudian climate is a vital factor in

that agriculture is generally confined to irregular pockets of good soil among the hills, each field an acre or two in extent and all the fields together occupying about 30 per cent of the island surface (Figs. 134 and 135).

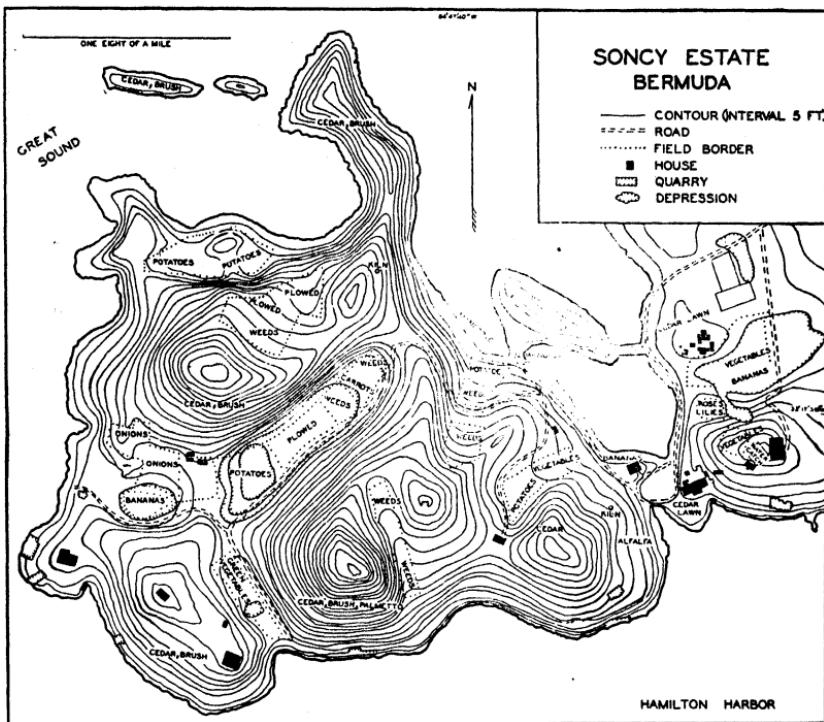


FIG. 134.—Land forms and land use on Soncy Peninsula, Bermuda.

making possible the special character of production.

Local factors other than climate are not particularly favorable for agriculture. The land surface is very hilly—not high and rugged but everywhere up and down in steep rounded hills and hollows like an area of dunes. The islands are in fact of dune origin, formed of shell sand on the stump of a truncated volcanic cone. Most of the dunes are now cemented into rock and covered with residual soil. Only in hollows is the soil relatively deep, so

The climate has favored the development of intensive commercial agriculture in these little patches, but not every phase of the climate is favorable. Violent winds and salt spray are characteristic of the climate. In many a year, tropical hurricanes visit the islands, and every winter there are winds strong enough to be injurious to vegetation. Fortunately the hills afford some shelter to the fields, tucked away in hollows among them, and the fact that the hills are wooded with cedar trees is a further protection. Supple-

mentary screens are formed by wind-break hedges, for which the oleander is the most effective shrub. In other respects, the climate is generally favorable for crops. The rainfall is heavy, well-distributed through the

winter. Bermuda is nearer to New York, New England, and eastern Canada than any other place with so mild a winter climate. This is an outstanding fact in the agricultural development of the islands.

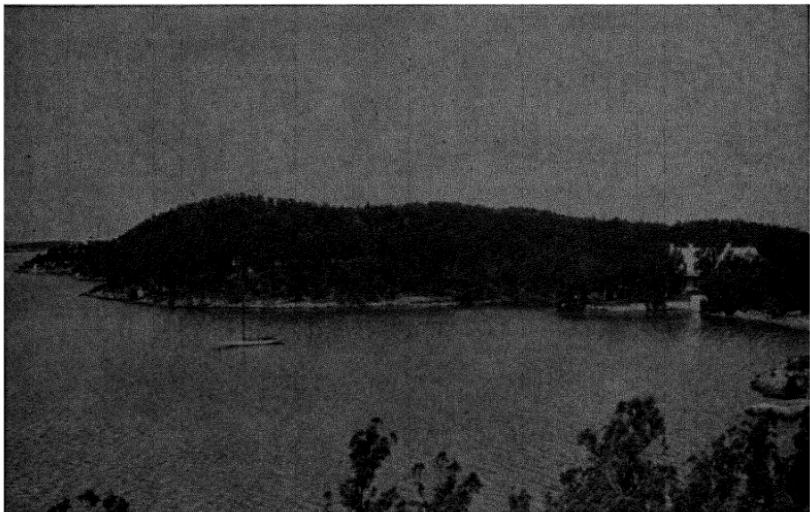


FIG. 135.—Soncy Peninsula. Owner's house and cedar lawn at right, cedar and palmetto woods on hills, old limestone quarries on shore. View looking west from neighboring shore.

year as a rule, and only occasionally deficient or excessive for the crops grown. Temperatures are high enough for plant growth in every season, and frost is practically unknown.

Commercial agriculture is worth while, not merely because the conditions are good, but because in certain respects they are exceptional in view of the location of the islands with reference to other lands. The conditions in summer are not exceptional, being then like those of other lands within reach. At that season the small, cramped Bermudian fields produce a few fodder crops and vegetables for local supply or lie idle, unable to compete with cheaper production on American farms.

The exceptional conditions are in

It is only in recent times that commercial agriculture has been successful in Bermuda. In the seventeenth century, Bermudian tobacco was found inferior and unprofitable, but for two centuries no more satisfactory crops were available. Not until the establishment of regular steam transportation could Bermuda capitalize the advantage of a winter-crop season. Only perishable crops are suitable, for non-perishable products can be produced elsewhere cheaply and stored for winter. The production of winter vegetables for the New York market fulfills the requisite conditions for profitable trade. With the establishment of refrigerator ships the industry has attained its fullest development.

Some products needing no refrigeration were the first to appear. Bermuda onions gained fame and are still the best crop available for exposed hillside fields, although their production has declined because of the competition of

is excellent, and they enter the market in the winter season of high prices.

One crop of another sort finds special advantages in Bermuda. Easter lily bulbs are produced in the islands not so much with reference to the nearness

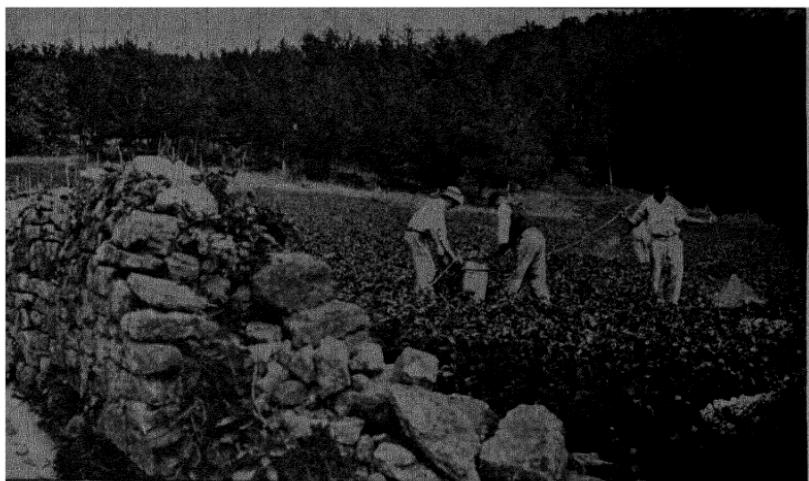


FIG. 136.—Potato field in a hollow among the hills, Bermuda. Spraying in March. Roadside wall at left. Cedar woods in the background.

"Texas Bermuda onions" in the New York market and because of the competition in Bermuda of more profitable crops. Bermuda potatoes followed onions and now surpass them as the leading crop of Bermuda (Fig. 136). They are of excellent quality and enter the market in late winter and early spring as a high-grade new product.

Green vegetables have appeared and increased to the limit of chillroom capacity on the ships plying between Bermuda and New York. These vegetables include not only celery, parsley, and lettuce, but also such root vegetables as carrots, beets, and turnips, shipped with the green tops on them. There are chances for loss on account of the great perishability of these crops, but there are also opportunities for large profits. The quality

of the New York market, as in the case of perishable winter vegetables, but chiefly because of the superiority of the product, unequaled near or far. Lilies were introduced in the latter part of the nineteenth century and flourished under Bermudian conditions of growth. The seasons of the year are well-disposed for the development of bulbs from which American florists can raise plants for the Easter season. On account of deterioration of stock through carelessness, the industry declined for some years, but by carefully supervised high-grade selection and inspection it has been revived.

Many kinds of fruit grow in Bermuda, and at times some of them have been exported; but their quality is not superior, costs are high, and the tiny, windy islands cannot compete with fruit districts elsewhere. Bananas

are the leading fruit, grown in many fertile sinkholes and in quantity just about sufficient to supply the local market.

Thus farming, intensive as it is, accounts for the presence of a considerable rural population—Portuguese

chief port for the trade of Bermuda, the town of St. George, at one end of the group, close to the open sea, is a maritime service station for salvaging, repairing, and supplying ships.

More important than isolation are positive relations to other lands.

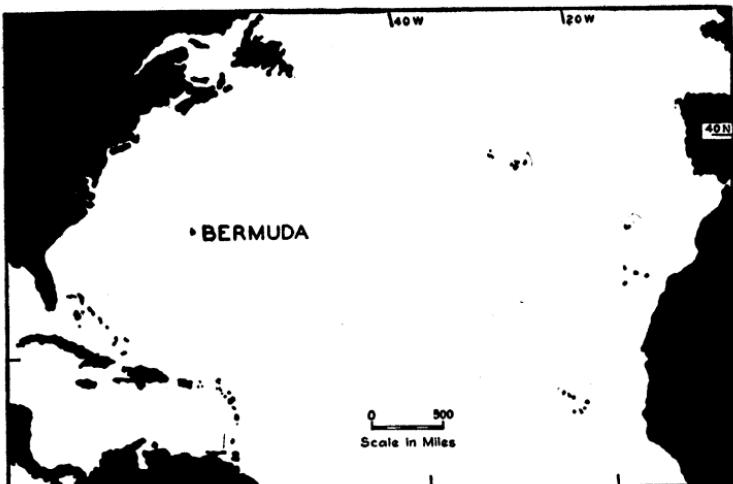


FIG. 137.—Location of Bermuda in the Atlantic.

settlers from the Azores and Negroes from the West Indies—but not for 1,000 people per square mile.

**SEA BUSINESS.** A large proportion of the population is not supported by the production of commodities. Year after year the imports of the islands greatly exceed the exports in value as well as in bulk. This fact is only to be accounted for by the rendering of services other than production. Ships flock to the islands for various reasons.

The location of the islands is important apart from the vegetable trade with New York. Even the fact of isolation brings some ships. In an area of 300,000 square miles of ocean, Bermuda is the nearest land, a refuge in storm, a place of relief and supply, a station on trade routes. Whereas the town of Hamilton, with its harbor in the heart of the island group, is the

Bermuda is near the center of an approximate semicircle of lands, half-way between Nova Scotia and the West Indies, and about equally distant from ports on the east coast of the United States (Fig. 137). This location has been of first importance in making Bermuda, at one time or another, a nest of pirates and of privateers between Europe and the Spanish Main, a center of carrying trade, especially for salt, between the West Indies and the American colonies, an entrepôt for blockade runners between the Southern Confederacy and England, a naval base, and a way station for trans-Atlantic air traffic. The Pan American Airways route has reestablished the old circuit of sailing ships between America and Spain, eastward via Bermuda with the prevailing westerlies and westward from Africa

to South America with the trade winds, for winter flying. Pirates, privateers, Confederate blockade runners, and salt peddlers have passed, but the strategic position of Bermuda remains.

A century ago, with the expansion of British imperialism and sea power, Bermuda was a natural selection as a naval base, which it has remained. The islands are well-situated with reference to British interests in America, between Canada and the West Indies. The old seat of British naval activity is Ireland Island, at the western end of the group, farthest within the encircling reefs and out of range from the open sea for guns of a century ago. This still accounts for some Bermudian activities and for some imports.

The islands are strategically situated also with reference to the Atlantic seaboard of the United States and were included appropriately among the first sites for bases granted by Britain to the United States (in 1941).

**RESORT BUSINESS.** An outstanding fact of location is the relationship of the islands to one port—New York. The importance of that relationship in the only large productive industry of Bermuda has been indicated. Finally, that relationship is preeminent in another interest of the islands—recreation.

The resort business capitalizes the same advantage as does truck farming—the winter climate, milder than in

any other land so near New York. Summer-tourist business has developed, but only as a by-product, using hotels and other facilities that otherwise would be idle. There are many cooler summer resorts much nearer to New York. But in peacetimes, winter brings great and intensive activity in the resort business, as in agriculture. Thousands of visitors leave the winter of New York for the warm sunshine and flowers of Bermuda.

Warm weather is the chief asset, but the islands have other attractions as well. The scenery is beautiful, unusual, and unmarred: the intricate chain of islands in which land and water intermingle, peculiarly blue water and mottled reefs, softly rounded hills and hollows, gray cliffs, white beaches, crystal caves, green cedars and palmetto trees, gardens on land and in the sea, winding roads, quaint stone houses, white towns. In spite of the small size and uniform structure of the islands, there is variety, seclusion, untouched wilderness.

With 1,000 inhabitants per square mile the islands are not crowded. The productive industries are crowded, having reached the limits of meager resources. But other activities are still growing. For the concentrated needs of transportation, war strategy, and peaceful recreation there seems to be a remarkable supply of space in this area of 19 square miles.

## Chapter V. The Guiana Colonies

From West Indian islands to South American mainland is an easy step. In both areas the sea and not the land provides main highways. The South American countries are like islands in the same way as those of Central America, separated by boundary zones that might as well be water from certain points of view. With all their regional unconformities

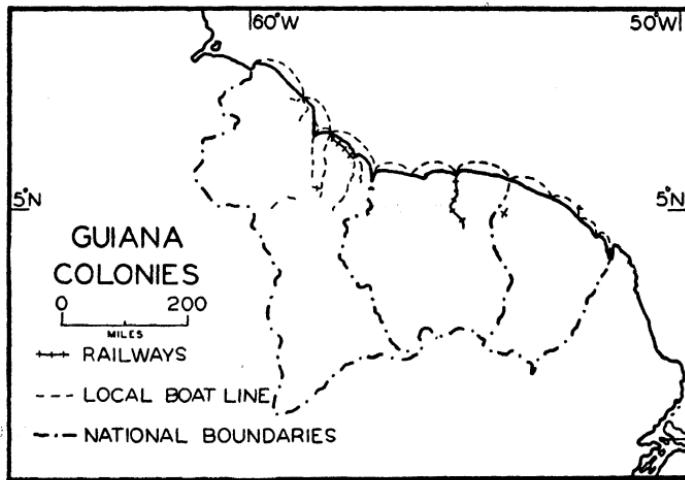


FIG. 138.—Local rail and water transportation in British Guiana, Surinam, and French Guiana. Coastal service and inland penetration. Detached interior boat lines are connected by highway links not shown on the map.

the countries are lined up around the continent in a row facing the sea, conveniently arranged for successive inspection (Fig. 2, page 10).

The Guiana colonies are linked commonly with the islands, reached by West Indian transportation, included in the same political and economic organization of the three European West Indian powers, and backed by the same history of second choice and lasting control. In total area, including unoccupied land, they are larger than island colonies, but in population and effective size they are smaller than some (Fig. 8, page 16).

They occupy the watershed of rivers flowing to the Atlantic between the greater systems of the Orinoco and the Amazon. The division into three colonies reflects separate occupancy of different rivers and their near-by coasts and apportionment by agreement between the three powers (Fig. 138).

**BRITISH GUIANA.** The heart of British Guiana is a plantation district in the fertile alluvial coastal lowlands. Outlying districts are in highlands

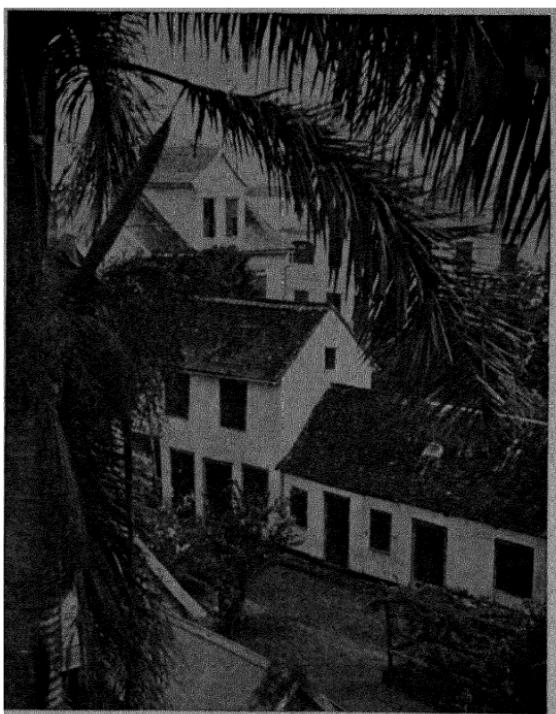


FIG. 139.—View from a hotel window, Paramaribo, Surinam.

of the interior, where sparse and scattered settlements are supported by mines, forests, and savannas and where forest Indian tribes maintain themselves.

SURINAM has a similar but less productive heart of plantations in the coastal lowlands (Fig. 139) and outlying districts in the highlands. In general, plantations of Surinam differ only slightly from those of British Guiana, in more distribution up rivers as well as along the coast, and in growing cacao as well as sugar cane. Likewise, the interior highlands in Surinam have sparse population, mines, and forests, as in British Guiana, with minor differences. A conspicuous minor difference is the presence in

Surinam of strong forest tribes of Bush Negroes as well as of Indians—tribes of African blood and culture, independent since the early days of slavery, when Negroes escaped from plantations and established themselves up river, in the forest.

**FRENCH GUIANA.** The heart of French Guiana is on the coast, but it can hardly be called a phenomenon of rural settlement, being a penal establishment, in which support from productive resources is a minor

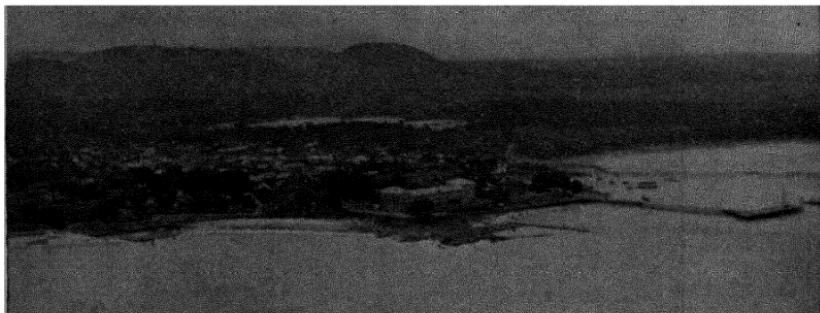


FIG. 140.—CAYENNE, French Guiana. Harbor at right, prison on waterfront, outlying hills of the Guiana highlands in the background. Air view looking southeast.

consideration (Fig. 140). Plantations on the coast are less prominent than gold mines in the interior.

Like the West Indies, the Guiana colonies await their fate in world affairs, under pressures that make local interests insignificant more so than they have been before or may ever be again. Nevertheless, local interests ultimately are significant, and local features even now are well worth observation.

### Field Studies

Of the following Guiana field studies, the first is of plantations on the coast of British Guiana (1), representative of the principal districts in the colonies of Britain and the Netherlands. The second is of bauxite mines in the interior of British Guiana (2) and indicates important phases of interior districts in all three colonies.

#### 1. ENMORE AND HOPE<sup>1</sup>

##### PLANTATIONS IN THE COASTAL LOWLANDS

This study deals with two plantations on the coast of British Guiana, occupying about one-tenth of 1 per cent of the area of the colony [Fig.

163, page 183, (1)]. Preliminary ideas about the place are supplied by the maps showing major divisions of Latin America. The two plantations are in the area

<sup>1</sup> Field work in September, 1935. R. S. PLATT, Reconnaissance in British Guiana, *Annals of the Association of American Geographers*, Vol. 29 (1939), pp. 105-126.

of climate characterized by heat and moisture in every season (Fig. 4, page 12). They are in a similarly great area of selva (equatorial rain forest) (Fig. 5, page 13). They are within the lowland plains of South America

found, a density of less than 1 person per square mile over most of the equatorial lowlands (Fig. 8, page 16) and a density of more than 250 per square mile in the spot under consideration.

PLANTATIONS. A close-up view of

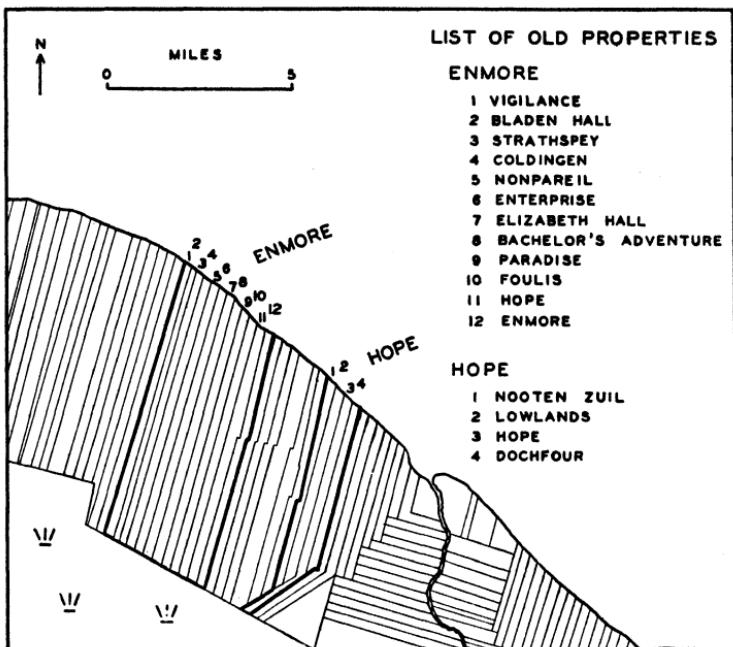


FIG. 141.—Consolidation of old plantations in Enmore and Hope. Neighboring old plantations are similarly consolidated, but their groupings are not shown. The list of old plantations includes Dutch names of the eighteenth century as well as English names of the nineteenth. (*Data from British Guiana Department of Lands and Mines, "Plan of the Sea Coast of British Guiana," 1: 190,080, Georgetown, 1925.*)

(Fig. 3, page 11). They are within the area characterized by laterite soils (Fig. 6, page 14).

These broad generalizations are useful, but they are only a beginning of geographic understanding. They are so broad as to be necessarily thin and coarse-grained. The two plantations are in the region of laterite soils, but they have no laterite soil on their land. Their vegetation cover is not selva and never was. In the generalized maps there is nothing to suggest a basis for the contrast in population here

this spot provides a focused picture within the misty frame of regional generalization. The two plantations, Enmore and Hope, are strips of land extending inland from the seashore about seven miles (Fig. 141). The land is a smooth plain of dark heavy soil, below the level of high tide at its seaward margin, sloping imperceptibly upward toward the interior. The greatest irregularities are works of man, and these are intricate and massive (Fig. 142): a wall to protect the front against the sea; a back dam to protect the

inland end against runoff from the land; and between these bulwarks a system of drainage canals to carry mensurate with recurrent conditions of flood and drought. The rainfall, averaging almost 90 inches annually,<sup>1</sup> is

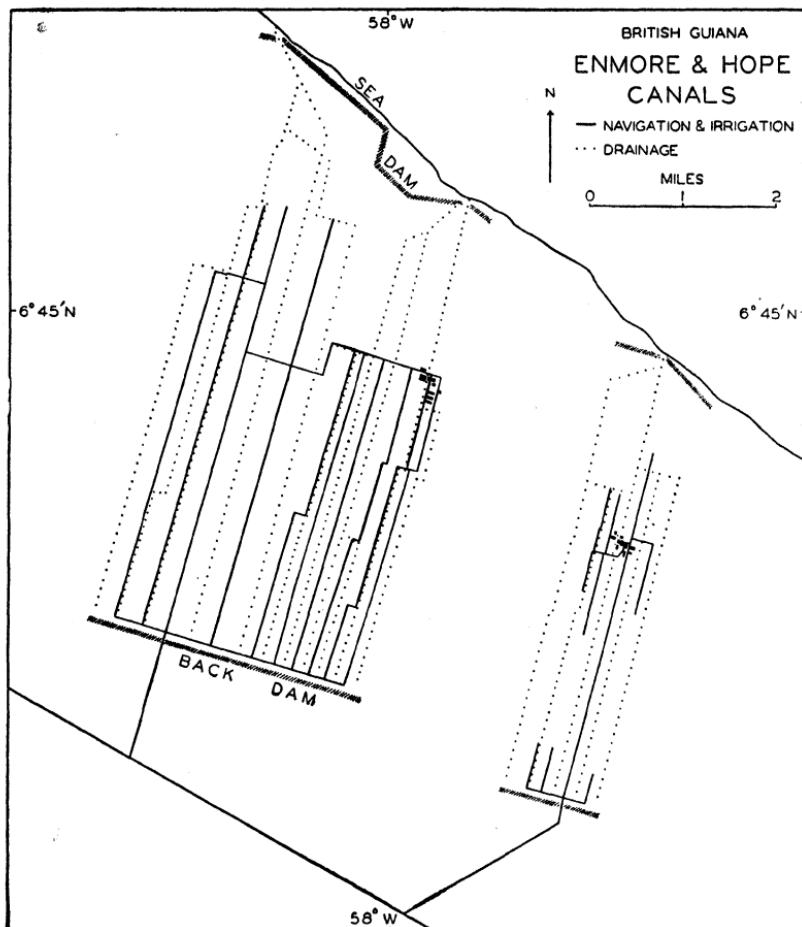


FIG. 142.—Two systems of canals between sea dam and back dam, in Enmore and Hope.

excess water to the sea, and a system of navigation canals bringing a supply of water from the land.

The system of water control is com-

characterized by regular seasons of concentrated fall and by irregular periods of abnormal excess. At times, the drainage system is taxed to the

<sup>1</sup> 89.08 inches mean annual precipitation, coastlands stations, 1846-1922; maximum 132.58 inches; minimum 44.98 inches (meteorological records, "British Guiana Handbook, 1922," pp. 279-287, Georgetown, 1923). 88.29 inches mean annual precipitation, Georgetown, 1880-1935; 86.35 inches total annual precipitation, 1935; 104.09 inches total annual precipitation, 1936; 28.27 inches, December, 1936, maximum month; 1.47 inches, August, 1936, minimum month ("British Guiana Blue Book, 1936" Sec. 29, Georgetown, 1937).

uttermost. Conversely, there are regular seasons of light precipitation and irregular periods of drought. At such times, the navigation canals provide a convenient supply of water for irrigation, drawn both from near-by

both in the eastern half (as shown on the map, Fig. 144) and in the western half (where only the gridiron of fields is indicated in Fig. 144). Sugar represents the survival of an old plantation interest, survival with changes through

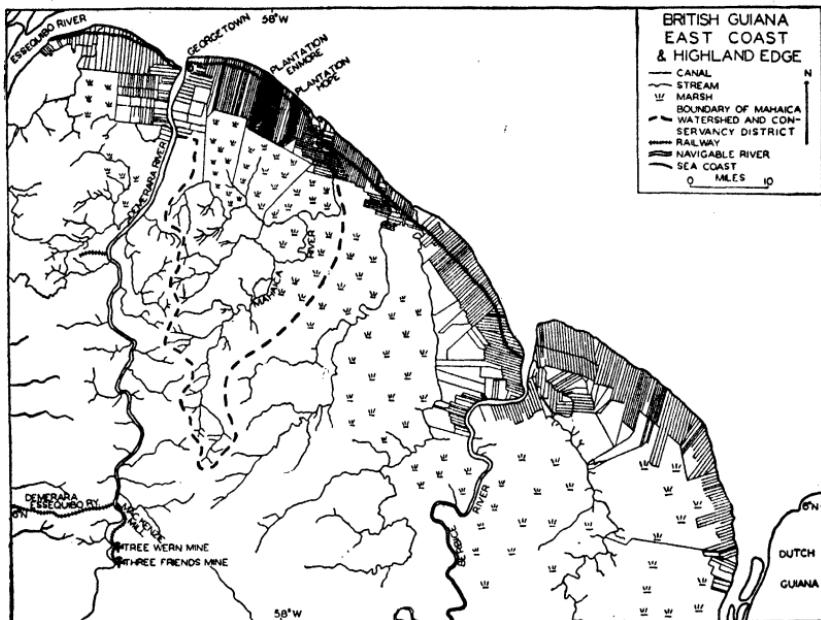


FIG. 143.—Plantations on the coast, streams supplying water, bauxite mines up river, British Guiana.

marshes and from the runoff of interior uplands, diverted to the plantation (Fig. 143). All major crops are irrigated, and flood fallowing of fields is practiced between crops.

Old fields at the seaward end of the property within the front dam are sour and waterlogged, and their cultivation has been abandoned (Fig. 144). Virgin land of marshy savanna at the interior end of the property beyond the back dam is exposed to floods and unprovided with canal systems. Accordingly, cultivation is confined to an intermediate body of land.

Sugar cane occupies the bulk of cultivated land in Enmore (Fig. 145),

two centuries: from Dutch to British possession; from African slave labor to East Indian free labor; from bonanza production on newly reclaimed land to specialized production with irrigation and commercial fertilizer on old land; from small-scale processing with animal power in the mills of 12 separate plantations (Fig. 141) to consolidation of the 12 into 1 plantation and large-scale manufacture of sugar and rum in a central mill.

In contrast to these changes of personnel and procedure the layout of plantation lands has changed very little from that planned by the first settlers and executed by their slaves

under Dutch rule. The pattern of empoldered fields still reflects the linear arrangement of the 12 constituent plantations (Fig. 144), the same drainage canals still carry water to gates

Hope also was a sugar plantation, but smaller than Enmore, composed of only four slave plantations (Fig. 141). Its obsolescent mill was abandoned in the postwar sugar depression, and a

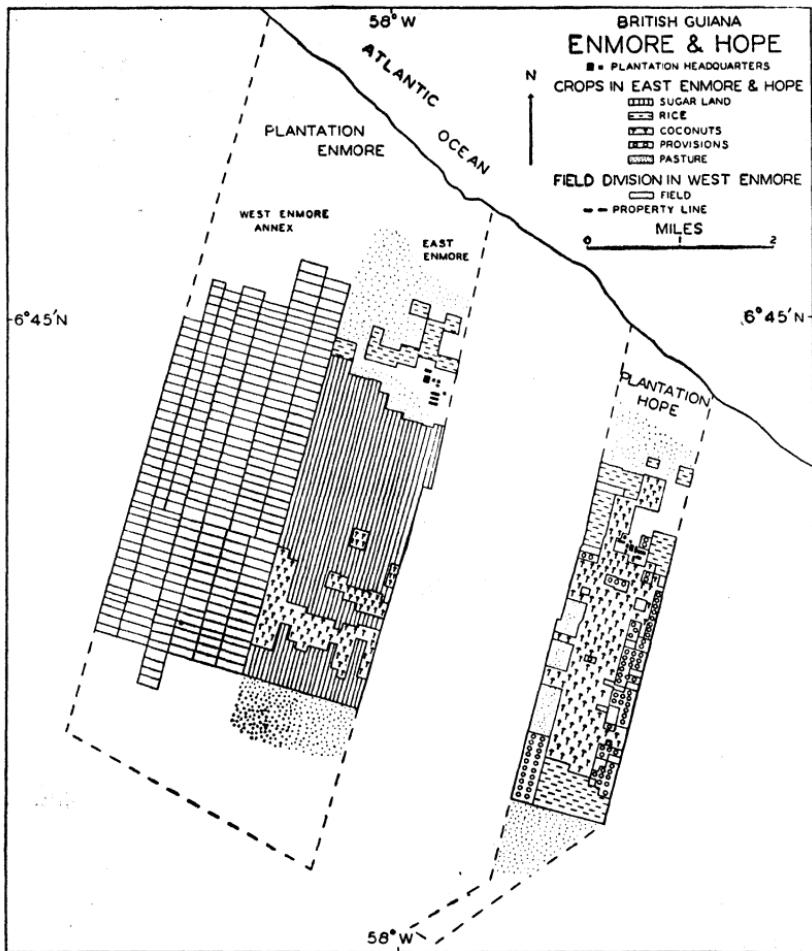


FIG. 144.—Crops shown in Hope and east Enmore; field division shown only in west Enmore.

in the sea wall (Fig. 142), and the same navigation canals still carry boatloads of cane from fields to sugar mill.

In Plantation Hope the bulk of the cropland is occupied by coconut palms (Figs. 144 and 146). Until a decade ago,

new owner has put the land to a new use. Coconuts are planted in the fields formerly occupied by cane, in the same heavy acidic soil, similarly drained, irrigated, and fertilized. The new productive enterprise is a success.

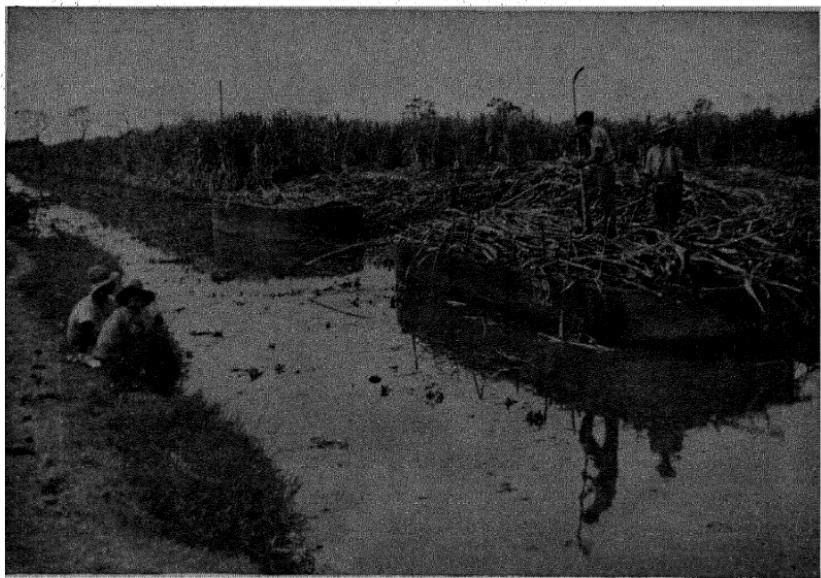


FIG. 145.—Sugar-cane harvest, Enmore. Cane loaded on steel punts; navigation irrigation canal; mule towpath on field dam at left; central-mill smokestack visible above standing cane in the background. View looking northeast.

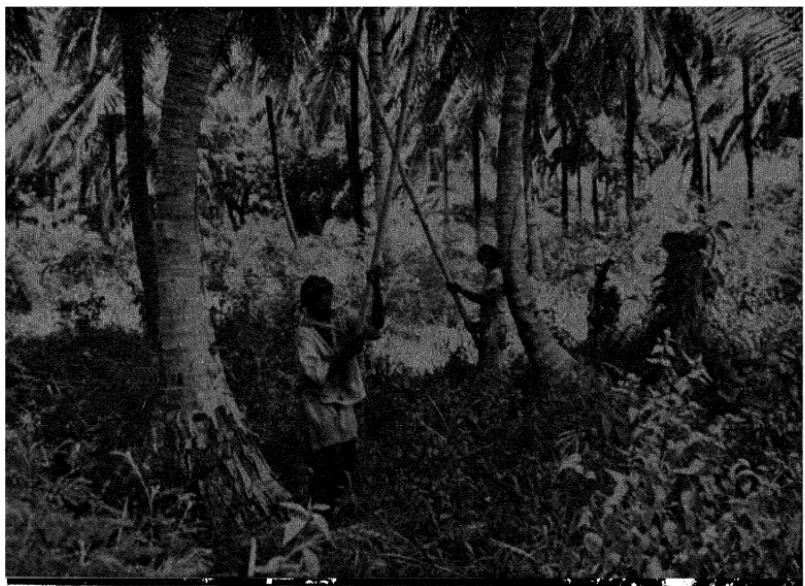


FIG. 146.—Coconut harvest, Plantation Hope.

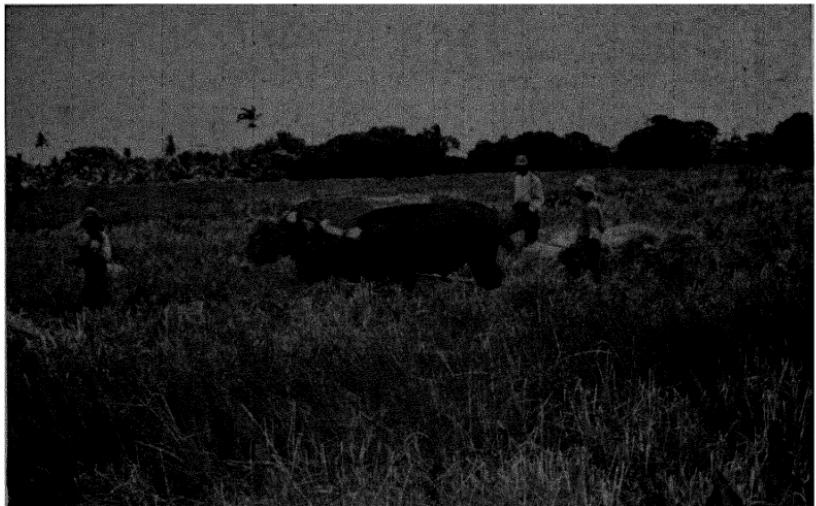


FIG. 147.—Rice harvest in back-dam fields, Plantation Hope.

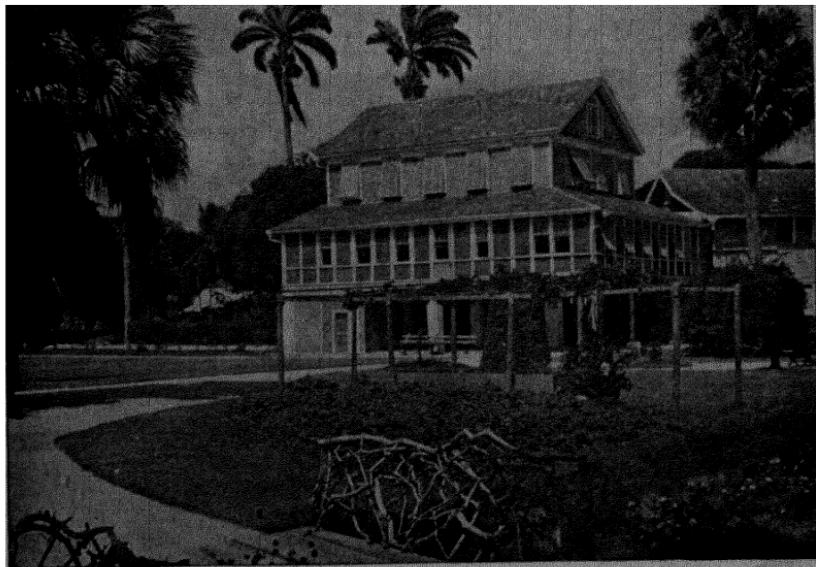


FIG. 148.—Owner's house, Plantation Hope.

At both Enmore and Hope there is another important crop—rice (Figs. 144 and 147), grown independently by East Indian laborers. Most of the land allotted for this purpose is along the

area, where irrigation water enters the plantation and is available for ample flooding.

Beyond the rice fields, both ends of the plantations are used as unim-

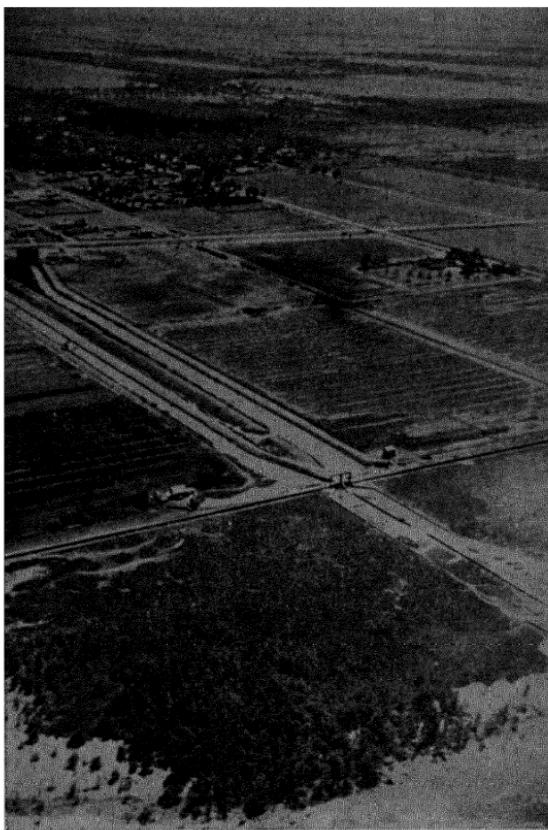


FIG. 149.—Neighboring plantations west of Enmore. Air view looking southwest from above the coast: sea dam across the view in the foreground; patch of shore thicket and wet savanna outside the sea dam below; drainage canals converging on a gate in the dam; highway and railway across the view in the middle distance; old idle fields between sea dam and highway; village and sugar mill beyond the highway; cultivated land in the background; back dam near the horizon, wet savanna beyond.

seaward side of the cultivated area, where the water table is high and seasonal flooding almost unavoidable. In addition to the "front rice" there is a smaller tract of "back-dam rice," on the landward side of the cultivated

proved pasture, at the front the old waterlogged fields, and at the inland end the undrained savanna, where cattle graze.

The two plantations and their subsidiary villages contain about nine-

teen hundred dwelling houses occupied by eight thousand people.<sup>1</sup> Of the

supplying the rank and file of field labor; 23 per cent (1,875) are Negroes,

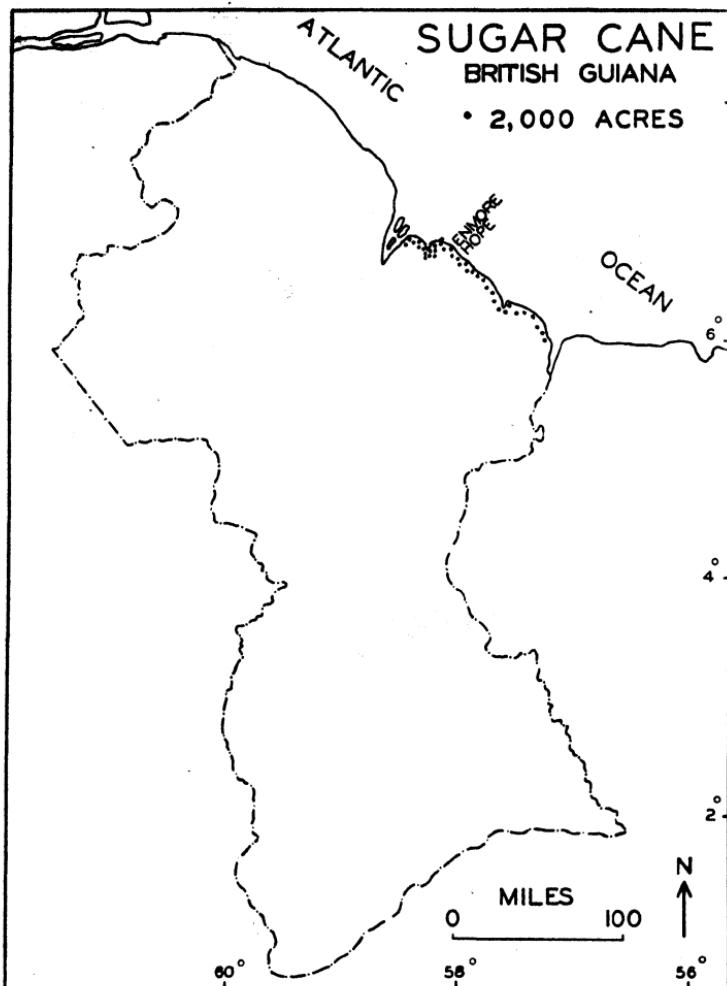


FIG. 150.—Sugar-cane acreage in British Guiana, 1936. (Data from "British Guiana Blue Book," 1936, Sec. 22, pp. 2 and 5, Georgetown, 1937.)

"inhabitants 69 per cent (5,578) are most of them born in the colony, "East Indians," from British India, supplying gang labor for special jobs

<sup>1</sup> 1,904 inhabited houses, and 8,065 persons in 1921. British Guiana Census Commissioner, "Report on the Census, 1921," pp. 19-21, 1922. The figures throughout this paragraph are derived from these three pages.

and for headquarters; less than 1 per cent (58) are white people born in the like the earthworks from a past regime (Fig. 148).

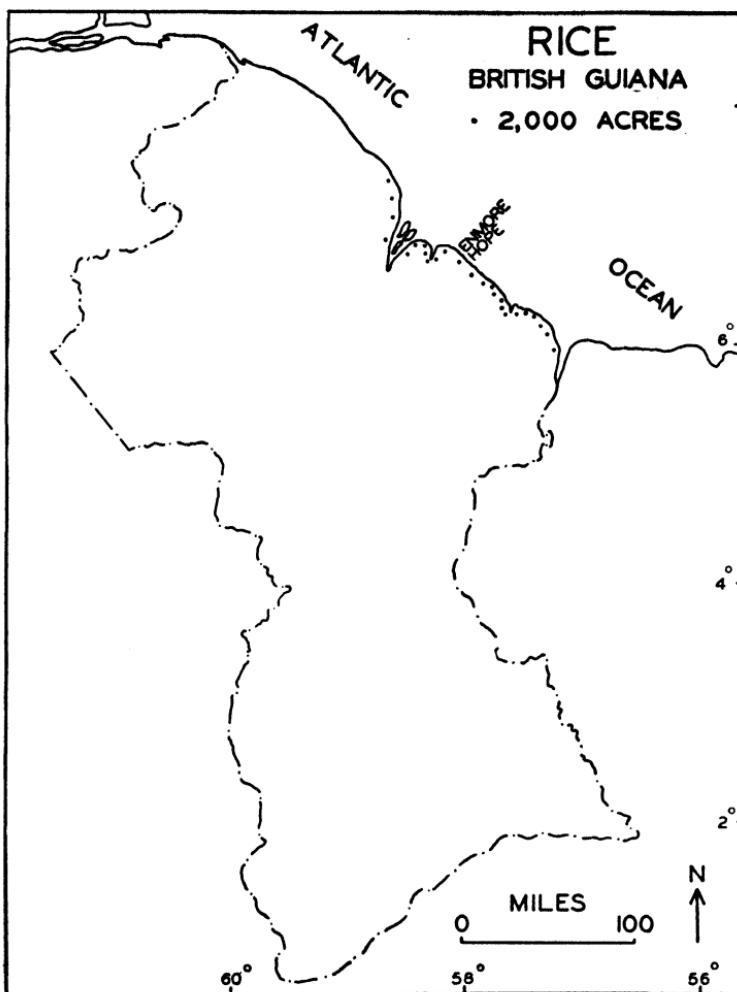


FIG. 151.—Rice acreage in British Guiana, 1936. (*Data from "British Guiana Blue Book," 1936, Sec. 22, pp. 2 and 5, Georgetown, 1937.*)

British Isles, representing ownership and management.<sup>1</sup> The organization is a benevolent paternalism, surviving

There is a gap between these micro-geographic facts and the broad generalizations of regional maps. General

<sup>1</sup> The remaining 7 per cent, 554 people in 1921, are Portuguese, Chinese, and "mixed races." *Ibid.*, pp. 19 and 20.

ideas of selva and sparse population do not apply to the plantations. Nevertheless, these spots do fit into regions,

by air along the coast reveals the extent of occupancy resembling that of Enmore and Hope (Fig. 149), in a single

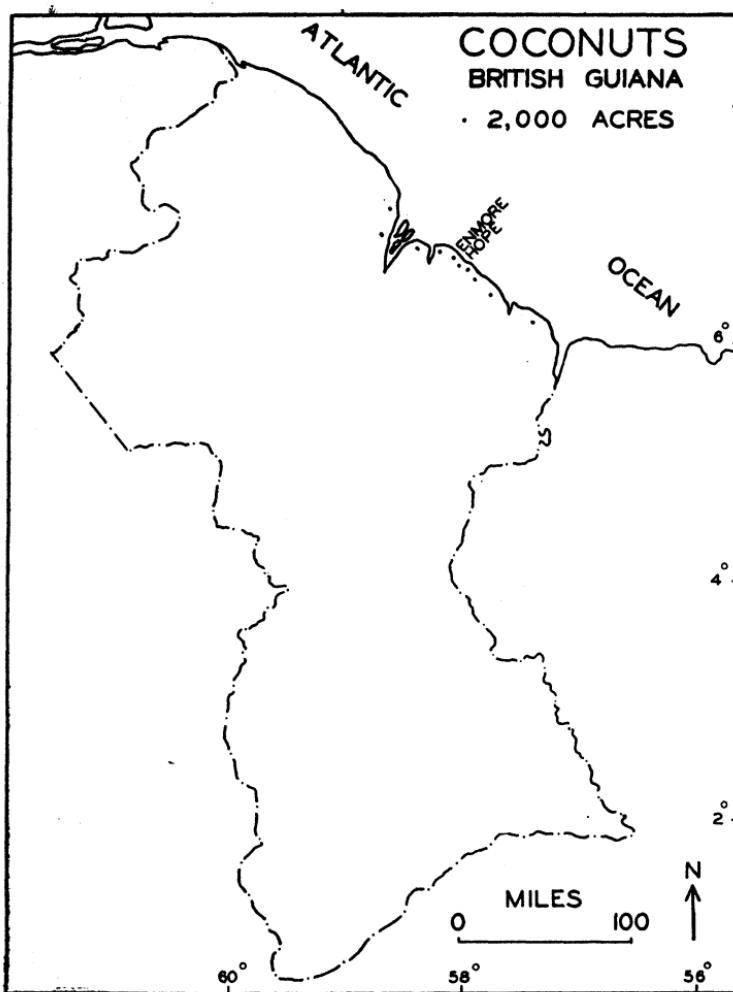


FIG. 152.—Coconut acreage in British Guiana, 1936. (Data from "British Guiana Blue Book," 1936, Sec. 22, pp. 2 and 5, Georgetown, 1937.)

and it is a geographic problem to see how they fit and to proceed from details to complex regional concepts following preliminary generalizations.

**COASTAL SETTING.** Reconnaissance

row of plantations, fronting on the shore and backing into wet savanna, extending along part of the coast and terminating sharply against uninhabited savannas and shore thickets.

This extent of plantations is reflected in the distribution of the leading crops of British Guiana: sugar cane (Fig. 150), rice (Fig. 151), and coconuts

being of British Guiana as a phenomenon of human occupancy.

Such overwhelming concentration in a small district is not explained by

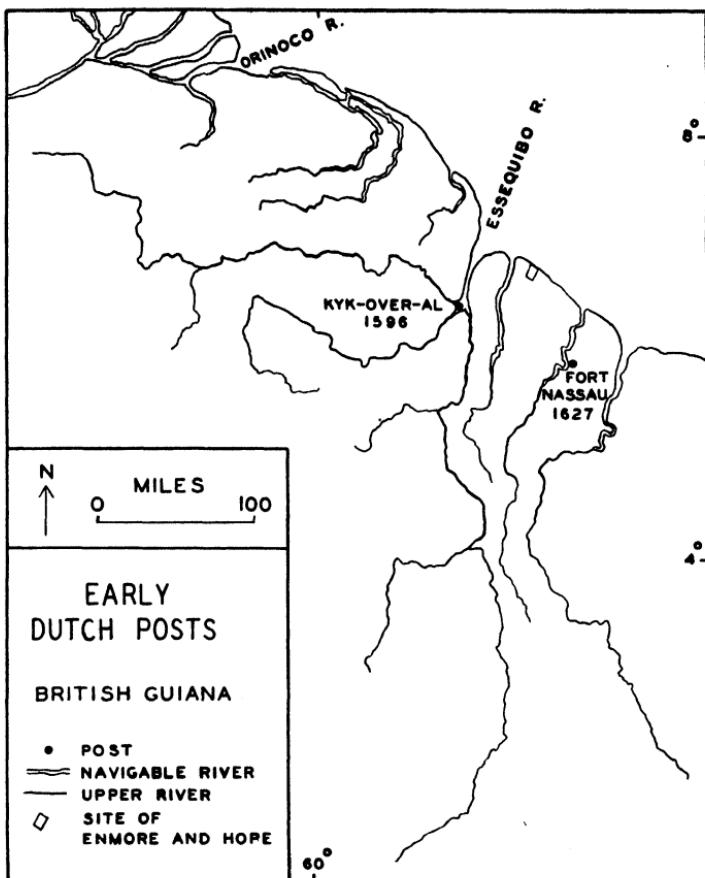


FIG. 153.—Pioneer Dutch posts in the area that later became British Guiana. (*Data from A. R. F. Webber, "Centenary History of British Guiana," pp. 6, 7, 9, 11, 35, Georgetown, 1935; from British Guiana Department of Lands and Mines, "Map of British Guiana," 1:3,168,000, Georgetown, 1915.*)

(Fig. 152). The concentration of people in the same area (Fig. 8, page 16) indicates that the southeast coast is the heart of British Guiana. In fact, the concentration is so nearly complete as to suggest that this district is not only the heart but almost the whole

facts thus far given. The regional maps of climate, soil, and vegetation do not distinguish between coast and interior. Only one of the maps previously mentioned, that of land forms (Fig. 3, page 11), marks off the coastal plain from interior hills.

Another general map, that of rock-structure regions (Fig. 7, page 15), makes a significant distinction, showing the Guiana coast as an area of unconsolidated sediments, in contrast with the interior region of ancient and

where foothills of the highlands extend to the water's edge (Fig. 140).

Thus, in British Guiana, recent alluvium enriched by the humus of wet savannas, in contrast with laterite hills of the interior, provides a setting

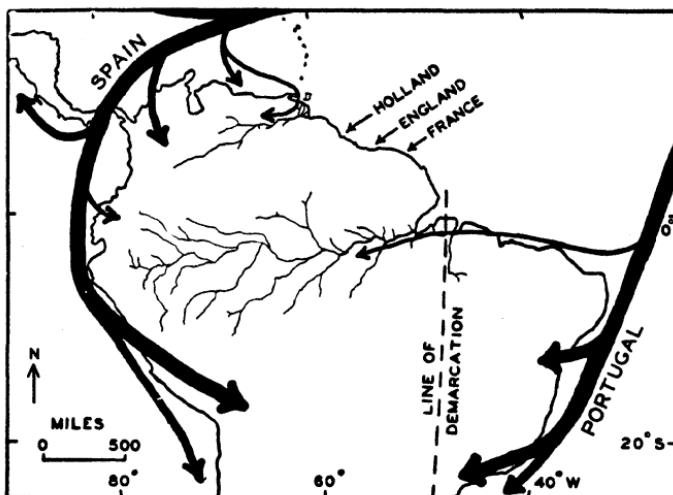


FIG. 154.—Streams of European colonial activity reaching tropical South America; the Amazon and Orinoco waterways to their heads of navigation; the Line of Demarcation, to separate Spanish and Portuguese interests, 1494, drawn according to Ribeiro, 1529. The streams of European activity are impressionistic, without quantitative basis for direction, length, or breadth of lines. These are not voyages of discovery but lines of established flow, on which traffic moved in both directions during many years of the Colonial Period. [Line of Demarcation from S. W. Boggs, *The Map of Latin America by Treaty, Proceedings of the American Philosophical Society*, Vol. 79 (1938), p. 401.]

massive rocks. Its location between the two great rivers, the Amazon and the Orinoco, is noteworthy—particularly its relation to the Amazon. The Orinoco has a delta, but not so the Amazon, and it has been said, to the distress of some Brazilian nationalists, that the Amazon delta is carried away by coastal currents and deposited on foreign shores.

The chief beneficiaries of this process appear to be the Guiana colonies. British Guiana has a particularly wide strip of alluvium and French Guiana a narrow strip. In fact, the coastal plain of French Guiana is interrupted

for plantations. But this does not account for concentration along only part of the coast. Interpretation of this fact involves consideration of an intricate distribution of features significant in the sequent occupancy of Guiana.

**LOCAL PAST.** The plantations of the present utilize massive earthworks of the past, the most immobile of cultural immobilia. Canals and dikes constructed by slave labor have been improved in modern times but not much extended. The distribution of the present is an acceptance of a

distribution of the past, which in turn was based on other past considerations.

At the beginning of colonial occupancy in Guiana a primary interest was trade with Indians, and for this purpose important sites were on rivers reaching

Establishment of coastal plantations proceeded in both directions from the Essequibo. But toward the northwest were Spanish settlers on the Orinoco who interfered with the Dutch and disputed their claims. Toward the

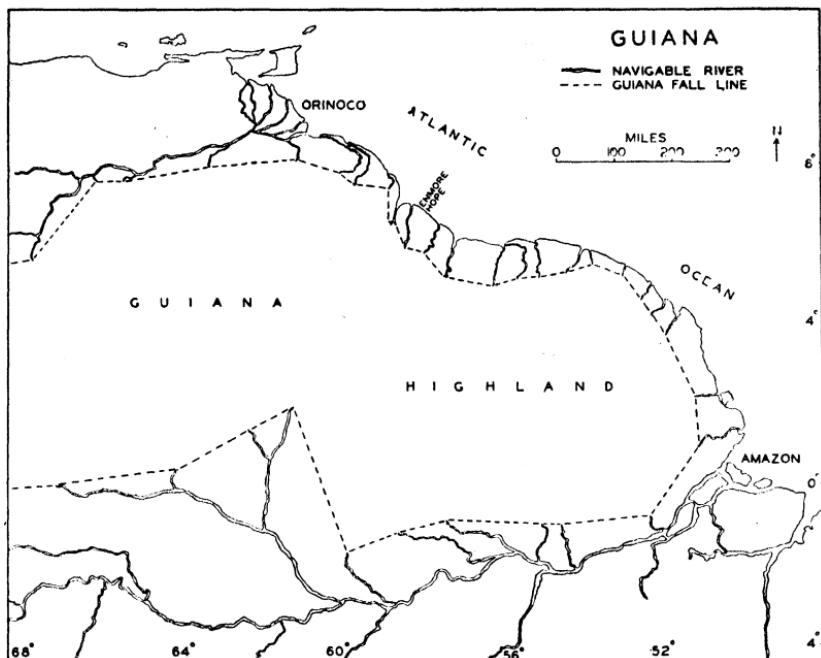


FIG. 155.—Guiana highlands and principal adjacent rivers navigable from the sea. The "fall line" is indicated by straight lines drawn between the heads of launch navigation. (Data from sheets of the American Geographical Society, "Millionth Map of Hispanic America," New York, 1929-1934.)

the interior. The greatest of Guiana rivers is the Essequibo. A Dutch trading post occupied a site near the head of navigation and became a center of colonial activity<sup>1</sup> (Fig. 153).

Plantations were established along the Essequibo. But these were not productive, and agricultural settlement spread to the coast. There water-control problems were greater but familiar Dutch methods were rewarded by greater returns.

southeast were small separate centers of Dutch settlement. Accordingly, a vigorous administration on the Essequibo closed the northwest to settlement and threw open the coast to the east.

The period of expanding settlement with slave labor and European sugar scarcity came to an end, while the western-boundary controversy with Spain and then with Venezuela dragged on to the end of the nineteenth century. In

<sup>1</sup> Source of data on the sequence of past events is A. R. F. Webber, "Centenary History of British Guiana," Georgetown, 1931.

recent years, established plantations have been maintained, but incentive to establish new districts has been lacking.

Thus localization of settlement along part of the coast is intelligible, if we

of relatively unattractive territory between the rich discoveries of Spain in the western highlands and those of Portugal in the Brazilian highlands (Fig. 154). Theoretically the Guiana coast lay near the boundary between

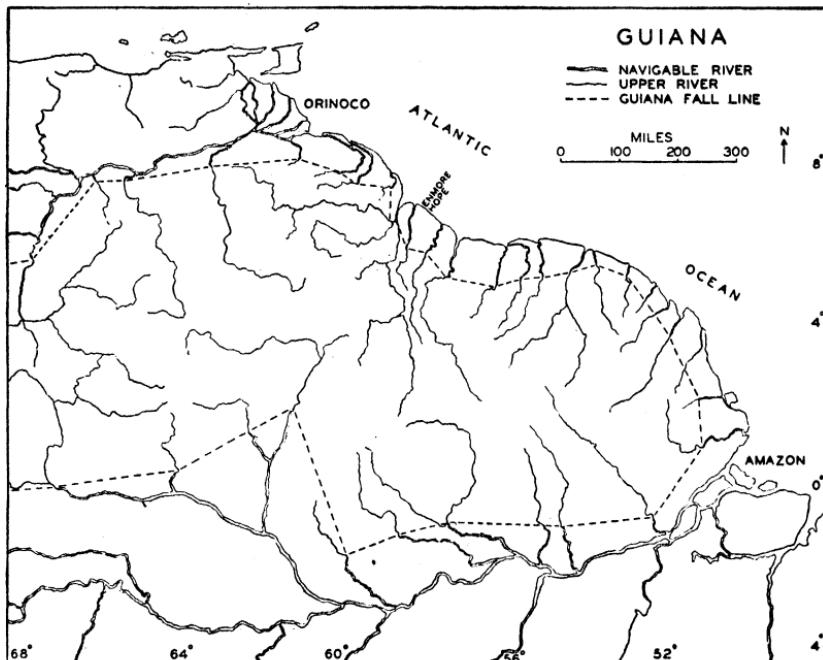


FIG. 156.—Guiana highlands, adjacent navigable rivers, and upper rivers above the lowest breaks in navigation. (*Data from sheets of the American Geographical Society, "Millionth Map of Hispanic America," New York, 1929-1934.*)

take for granted the original European spheres of influence as historical accidents, Spanish activities in one area and Dutch, English, and French in others. But such historical accidents have a geographical setting traceable in larger regional facts.

**REGIONAL PAST.** When Spain and Portugal dominated America and divided the New World between them, their spheres of influence were separated theoretically by a north-south line (Fig. 154). But practically these spheres were separated by a wide zone

Spanish and Portuguese territory, on the Spanish side of the line. Practically this coast was a backwater far from the main streams of Spanish and Portuguese activity.

Only secondary lines of activity reached toward this backwater: Spanish activity to the Orinoco from north and west, and Portuguese to the Amazon from south and east, weak efforts that spent themselves at river outposts and extended along the rivers rather than into Guiana between the two.

The Guiana interior was and still is relatively uninviting (Fig. 155), offering only small rewards in return for penetrating beyond a girdle of cataracts, into selva, among stubborn Indian tribes. The Spanish and Portu-

advised Guiana as an opportunity for fortune seekers, it was only as a consolation prize to England, after all known sources of wealth had been acquired by Spain and Portugal.<sup>1</sup> And the prize did not then materialize.

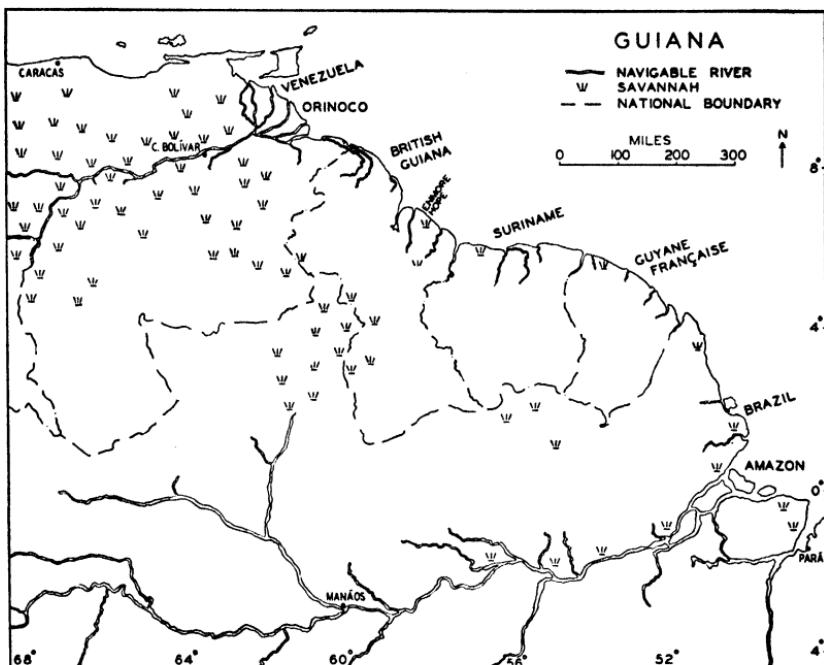


FIG. 157.—Areas of savanna, Guiana highlands. Forests occupy the nonsavanna areas. (Data from "British Guiana Blue Book," 1936, Sec. 22, p. 2, Georgetown, 1937; from H. Pittier, "Mapa ecológico de Venezuela," 1: 2,000,000, Caracas, 1920.)

guese had good reason to view the area between their respective rivers as a boundary zone, separating their spheres of influence and not worth vigorous conquest. Gold resources of Guiana, unlike those of the Andes and Brazil, were little mined until later times, late in the nineteenth century.

There were, to be sure, sixteenth century reports of Guiana gold. But when Sir Walter Raleigh tried to penetrate to legendary El Dorado and

So the insignificant posts of Holland, England, and France on the Guiana coast and similarly insignificant posts of Spain on the Orinoco and Portugal on the Amazon were concerned with affairs on their own water fronts, and only secondarily with far-off neighbors and the highland wilderness between the heads of navigation. Along upper rivers to headwaters (Fig. 156), penetration was about equally feeble from all three sides. Penetration across

<sup>1</sup> W. RALEIGH, *The Discovery of Guiana*, Hakluyt's Voyages, Vol. 7, pp. 272-280, 344-350, New York, 1927.

divides was limited to savannas (Fig. 157), chiefly near the Orinoco.

Present-day boundaries coincide with the divides, except in savanna areas, and near the Amazon mouth, where

on the British map today<sup>1</sup> in the concentration of plantations east of the Essequibo.

Thus a microgeographic area in Guiana, evidently not typical of broad



FIG. 158.—Major water partings and national boundaries, Guiana highlands. (Data from sheets of the American Geographical Society, "Millionth Map of Hispanic America," New York, 1929-1934.)

weak French occupancy was dislodged by pressure from Brazil (Fig. 158). At the Orinoco mouth, British Guiana was not pushed far from the river, but Spanish pressure on that side was felt nevertheless, as indicated in the Dutch prohibition against settlement northwest of the Essequibo and expressed

regional types and even appearing at first like an abnormality in the coarsely woven blanket of generalized regions, is found by reconnaissance study to be a normal feature of a coherent plantation district, which in turn has a consistent place in the intricate geographic pattern of South America.

<sup>1</sup> To trace the changes of sovereignty in the part of Guiana held by England, Holland, and France would not serve the purposes of this study. Each of the three nations has claimed the whole area and has controlled the whole at one time or another. In the several settlements, one sovereignty has succeeded another without breaking the continuity of occupancy; present inhabitants are cultural descendants, though not blood descendants, of past inhabitants. The present division represents a nineteenth century status that lasted long enough to jell.

2. MACKENZIE<sup>1</sup>

## BAUXITE MINES UP THE DEMERARA RIVER

Deposits of bauxite occur in the districts best located for development in the Guiana highland region of "ancient" movement is near the seaward margin of the

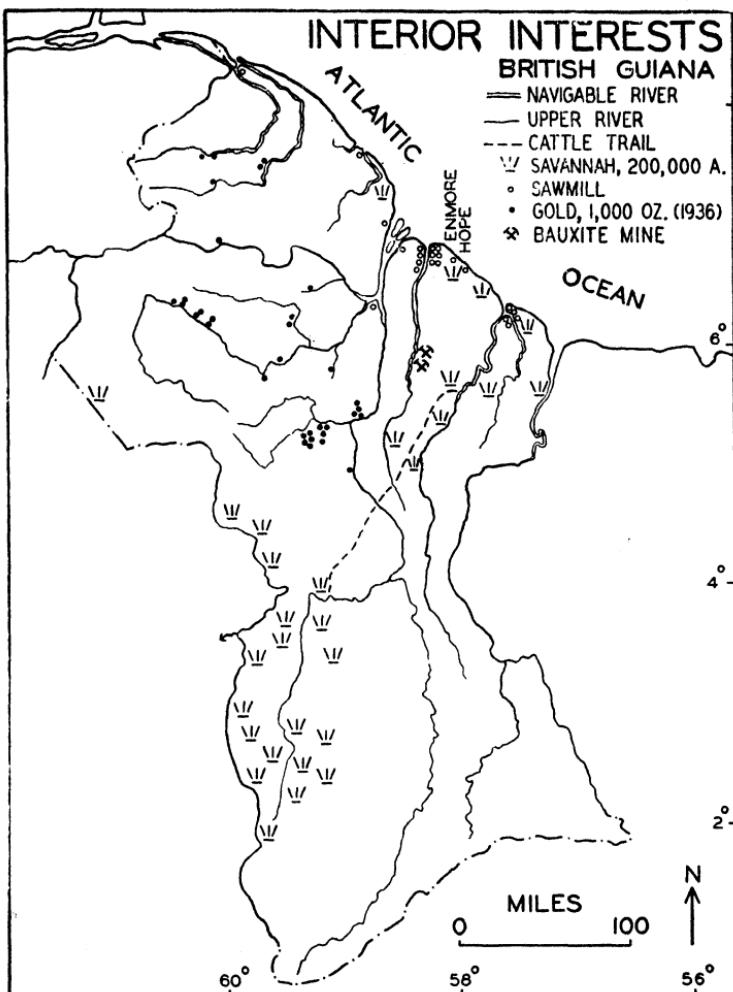


FIG. 159.—Mineral, forest, and grazing interests, British Guiana. (Data from British Guiana Department of Lands and Mines, "Map of British Guiana," 1: 1,000,000, Georgetown, 1924.)

and massive" rocks [Figs. 7, page 15, 159, and 163, page 183, (2)]. One of the highland in British Guiana, alongside the Demerara Valley, 80 miles upstream

<sup>1</sup> Field work in September, 1935.

from the river mouth and 8 miles above the head of steamship navigation (Fig. 143).

**MINE SITE.** Here the river is bordered by a low upland with hills little more than 100 feet in elevation,

forest grows, underlain by red soil and sand to a depth of 24 feet, refractory bauxitic clay in the next 24 feet, and below this high-grade bauxite, a white crumbling material, 24 feet thick (Fig. 160). It is a product of rock

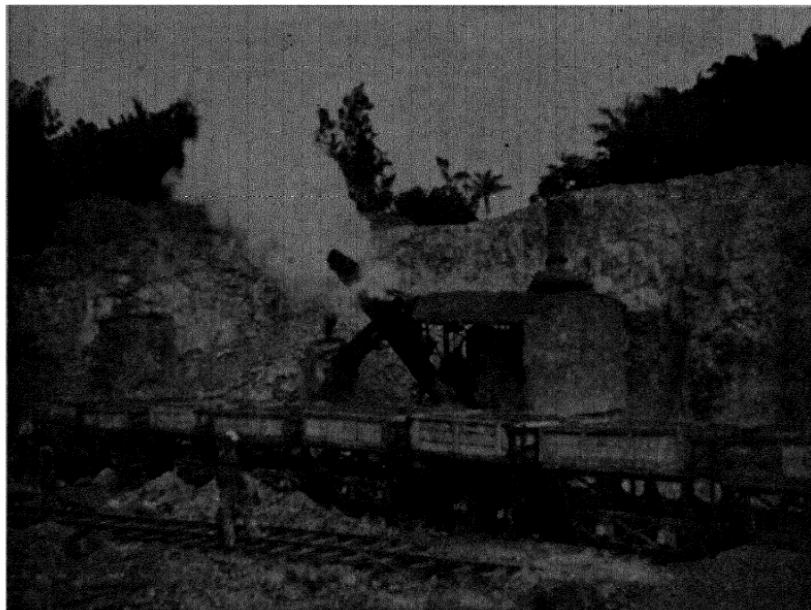


FIG. 160.—Tree Wern Mine, British Guiana. Steam shovel at mine face loading bauxite for rail transport to Mackenzie mill. Upland forest visible in the background beyond the area where the surface has been stripped of overburden. View looking east.

near the transition from hill country to coastal plain. Both upland and valley are covered by heavy mixed rain forest constantly luxuriant, a contrast with the savannas, mangrove swamps, and plantations of the coast. Here are a variety of land forms congenial to climax forest, a greater precipitation than on the coast, more than 100 inches annually, and no distinct dry season.

The hills are subdued by denudation and covered by a deeply weathered mantle of regolith concealing the bedrock. Bauxite occurs in the regolith. A section of valley bluff facing the river reveals an upland surface on which

decomposition at one horizon underlain by other strata of sterile clay. The 24-foot intervals are approximations at one exposure; in mining, they are convenient working intervals. Variations from place to place are considerable.

Unlike the older gold-mining industry of the Guiana highlands, bauxite mining is exclusively modern. Exploitation of the deposits on the Demerara River is planned and carried out in a world-wide scheme of production. Makers of aluminum in North America, who formerly obtained their raw material from near-by sources now nearing depletion, reached out to the next convenient potential source of

supply. The Demerara deposits were chosen for large-scale development, and a mining district sprang from the

the bluff is attacked. The forest on the upland is cut back from the edge of the bluff; steam shovels advance

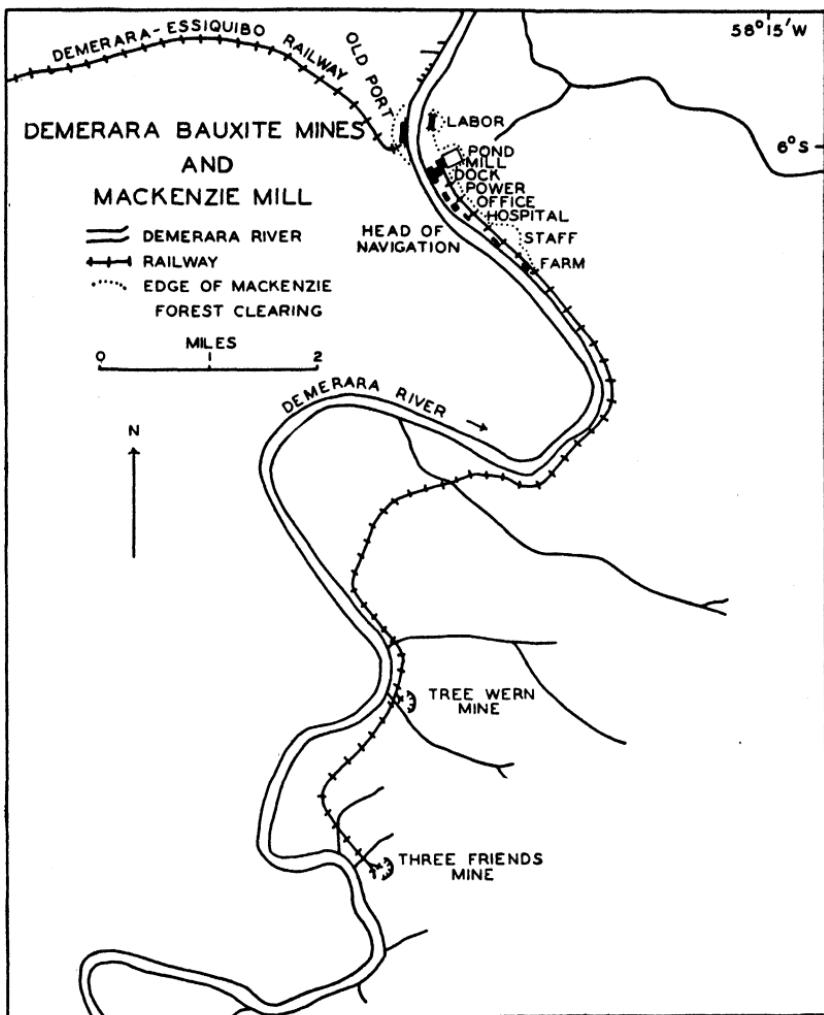


FIG. 161.—Bauxite mines and mill town on the Demerara River.

forest into full-grown, well-coordinated activity.

Strip mining with steam shovels is the method adopted (Fig. 160). Operations are like those of a stone quarry. The valley provides a base from which

on a level 24 feet below the upland surface and remove the upper half of the overburden. Other shovels on a level 24 feet lower remove the lower half of the overburden down to the top of the bauxite bed. The waste

material is loaded into cars and dumped near by in the valley.

On a third level 24 feet lower, at the bottom of the productive bed, shovels dig into the mine face and load ore into cars bound for the mill.

taining an impressive array of establishments located at a focal point for serving both present mines and others that may follow. This is Mackenzie.

The central group of buildings deals with the product of the mines. As it

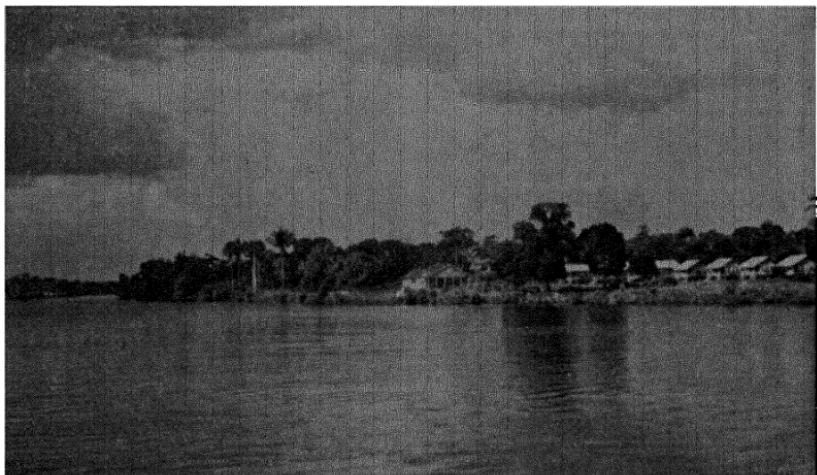


FIG. 162.—Laborers' dwellings and assembly hall, the northern end of Mackenzie, downstream from the mill and other buildings near the head of navigation. View looking northeast down the Demerara River from the west bank.

At the two mines, Tree Wern and Three Friends, there are small clearings in which there is little else but the mine face overlooking a few acres of bare ground already passed over by the operations, a few piles of waste, and the ramifying ends of narrow-gauge railway track. Except for three or four small shelters and storerooms there is an absence of buildings. The 5-ton steam shovels are the most imposing structures.

**MILL SITE.** Establishments associated with the mines are located at the other end of the railway, which extends down the valley to navigable water, a distance of 10 miles from Three Friends, the farther mine (Fig. 161). There at the head of navigation for ocean-going vessels of 18 feet draught is a much larger clearing along the east side of the river, con-

comes from the ground, the bauxite is mixed with impurities. By relatively simple processes, most of the impurities, almost 50 per cent of the total weight of the ore, can be removed. A crusher receives the cars of ore from the mines. Washing follows crushing, for gravity separation of the waste matter. Water for this and other purposes is pumped from the river. Disposal of waste in the form of sediment suspended in water presents a problem; for the river, tidal to this point, would not carry it. Solution of the problem has been by a dam in the flood plain, forming a pond where waste water is discharged and sediment can settle. The concentrated ore moves into a kiln drier where the superfluous burden of water is removed. Thus prepared for shipment, the product is accumulated in a storeroom beside

the dock, ready to be loaded in bulk when cargo ships of the company come alongside, as they do regularly on a schedule attuned to the needs of the international organization.

The purified bauxite is still less than half aluminum and more than half waste matter, but further processes of separation require large installations and great amounts of heat and power not to be obtained in British Guiana, except at a cost far greater than the slight saving that would result from elimination of the waste tonnage before shipment.

Existing installations on the Demerara already mentioned require a powerhouse located to receive coal brought as return cargo on bauxite ships. The only local fuel is wood, an economical source of heat and power for some purposes. The railway engines are wood-burning.

**TOWN SITE.** Along the river upstream and downstream from the central group of buildings are other establishments. Upstream are the office, laboratory, wireless station, hospital, quarters for the foreign staff of about 20 people, and a dairy farm to supply

the staff. Downstream are stables, shops, and village for the labor force of about 100 Guiana Negroes (Fig. 162).

Living conditions on a flood plain of the rainy tropics raise problems of health for both foreign staff and native labor. Malaria has been prevalent in the area. But these problems, like others, have been faced squarely and comprehensively from the outset, and highly satisfactory conditions have been maintained.

It is not merely accidental that an older village is situated across the river opposite Mackenzie. Taking advantage, like Mackenzie, of the head of navigation on the Demerara, Wismar was selected as the starting point of the railway from the Demerara to the Essequibo River, the navigable Demerara being thus used to avoid unnavigable sections of the lower Essequibo on the way to the far interior of the colony. This route has now ceased to function, with the improvement of navigation on the lower Essequibo. Therefore Wismar is fading on its own account and shines only with reflected glory from the bright new settlement across the river.

## Chapter VI. Venezuela and Colombia

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Venezuela and Colombia are taken together as the two Caribbean countries of South America. They are similar not only in fronting on the Caribbean Sea but also in size of area and regional structure (Fig. 2, page 10).

**SIMILARITIES.** Each has coastal lowlands, highlands containing the core of the country, and interior lowlands. In each, the main highlands are a transverse slice of the Andean chain (Fig. 3, page 11) and include areas of low highland and high highland types of climate (Fig. 4, page 12). In each, the interior lowlands are mainly a share of the major region of eastern South American lowlands drained by the Orinoco (Fig. 3, page 11), climatically tropical with seasonal rainfall (Fig. 4, page 12), a savanna area known as the Llanos (Fig. 5, page 18). On the seaward side of the highlands the broken fringe of coastal lowlands also has tropical climates of seasonal rainfall in most sections.

The people of both countries are mainly of Spanish and Indian blood, largely mestizo, but with unmixed Indian tribes in some outlying regions and unmixed white groups in some centers of population. Negro blood is an element in coastal lowlands.

**DIFFERENCES.** Beyond these general characteristics the two countries are different from each other. Some differences are obvious but secondary. For instance, Venezuela includes the Orinoco Delta and a share of the Guiana highland region, partly forested, as far outlying areas, whereas Colombia includes a share of the Amazon lowland region, densely forested (Fig. 163). Venezuela has only Caribbean and Atlantic coasts, whereas the Colombian coastland extends beyond the Caribbean to include a frontage on the Pacific, like Central America and unlike other South American countries.

**VE<sup>N</sup>EZUELA.** Other differences are more fundamental. The population of Venezuela is less than half that of Colombia, reflecting primarily the fact that the core region is much smaller and less productive (Fig. 8, page 18). The national core of Venezuela is in coast ranges conveniently close to the northern edge, where the northeastern extension of the Andes

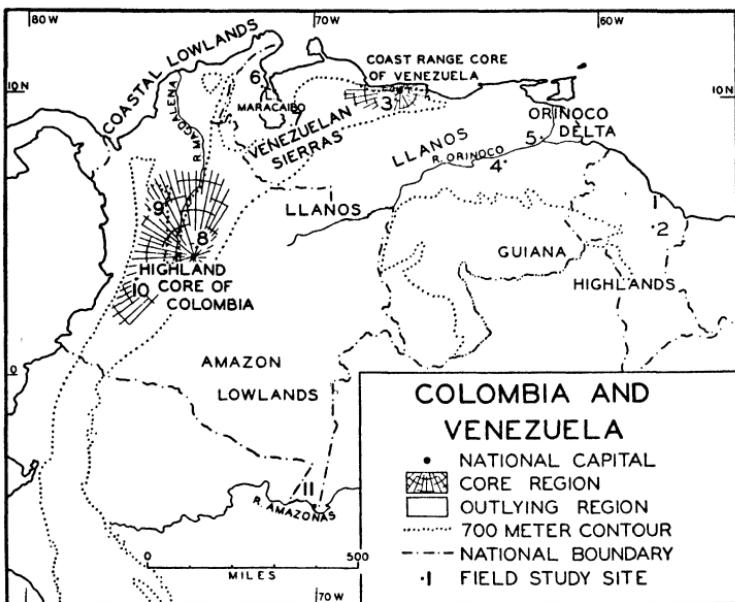


FIG. 163.—Regions of Colombia, Venezuela, and the adjacent part of the Guiana colonies. Study sites in the order of discussion, including first the two in British Guiana.

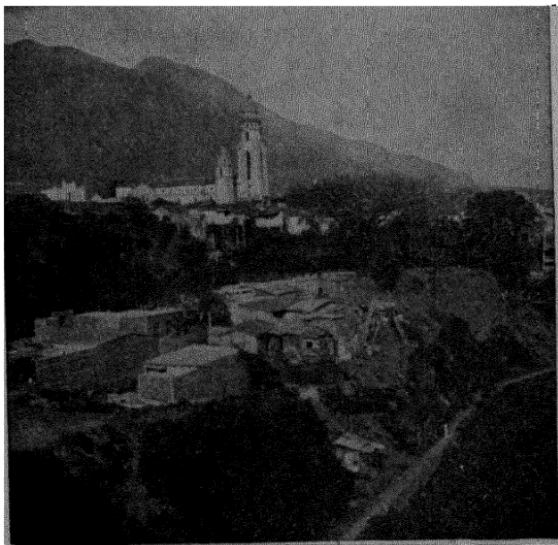


FIG. 164.—Caracas, capital of Venezuela. Several grades of urban occupancy at different levels along an arroyo cutting through the city. Peaks of the coast range in the background. View looking northeast, March, 1940. Altitude 3,000 ft. (Photograph by Jay S. Seeley.)

borders the Caribbean. The area is one of fertile filled basins among low ranges, high enough to avoid lowland heat but within the zone of tropical agriculture (*tierra templada*), like low plateaus of Central America (Fig. 164). In fact, the district is more like the heart of a Central American country than that of Colombia in size and population. It differs from Central American centers chiefly in having much larger regions otherwise unappropriated lying about it—a less accessible part of the Andes to the

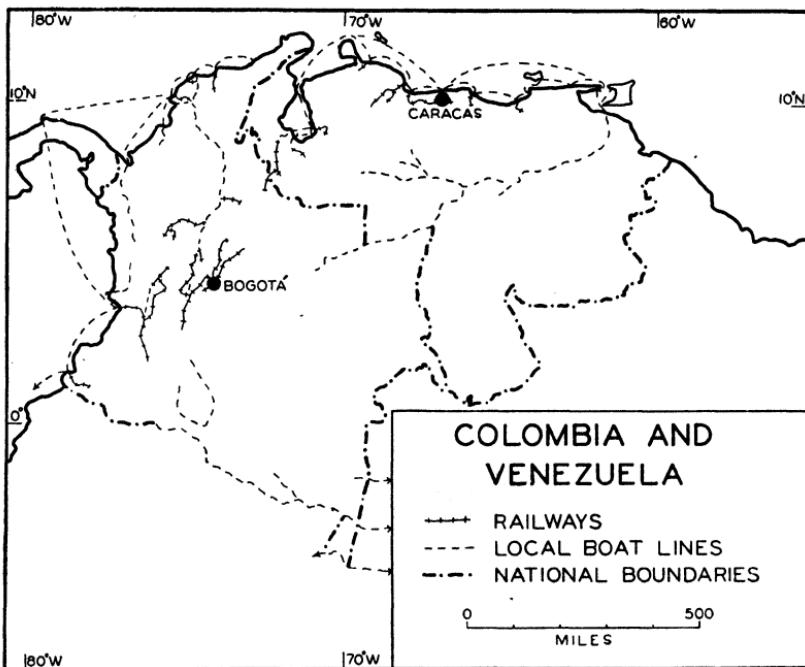


FIG. 165.—Local rail and water transport, in each country a national system giving an approach to national unity. 1940.

southwest, dry lowlands and highlands east and west along the Caribbean shore, and the contiguous parts of the Orinoco lowlands and Guiana highlands to the south (Fig. 163). Among these great areas the central core is not clearly dominant either in total population or in productivity, but it is unrivaled as an accessible area favorable for habitation and densely inhabited. Obviously the term "central core" is used in a dynamic geographic sense, referring to vital organization, as opposed to a static geometric sense, referring to mere measurement in miles.

The outlying regions of Venezuela have been tied to the central core by an improvised but serviceable system of transportation, utilizing mainly water connections, from which short railways penetrate the land,

as in separate Central American districts (Fig. 165). Sea routes extend eastward along the coast and to the Orinoco and westward into Lake Maracaibo, with odd breaks in traffic at foreign island ports in Curaçao and Trinidad.

A traffic revolution has followed a system of motor highways connecting the capital district by land with outlying regions, particularly with

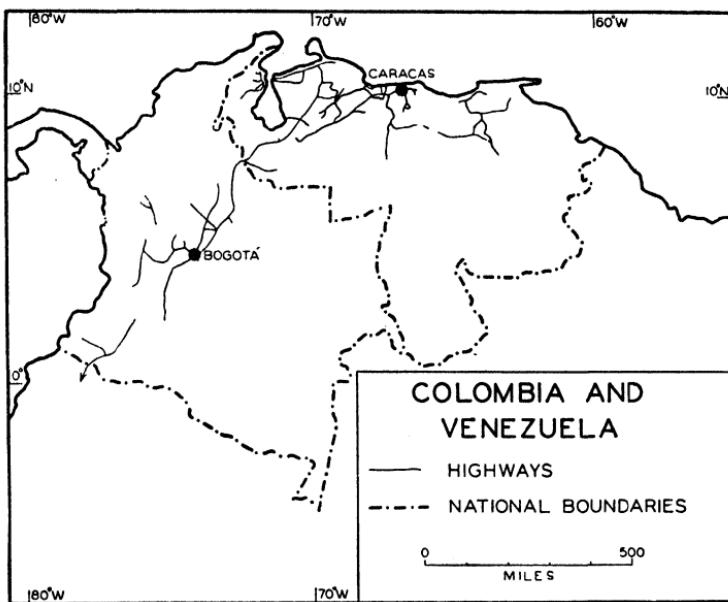


FIG. 166.—Motor roads passable in every season, supplementing rail and waterways to attain national unification, by short-circuiting water routes in Venezuela and filling railway gaps in Colombia. 1940

Evidently the pattern represents much more, beyond the scope of the present discussion. The highway map is included in this case only as an example of relationships that could be followed further in all the countries.

the productive and populous southwestern Sierras and the less productive and less populous Llanos and Guiana highlands (Fig. 166). Simultaneous development of a national system of airways has accelerated and accentuated the traffic change (Fig. 167).

Territory now included in Venezuela was conspicuously located and was discovered and occupied relatively early by Europeans in the period of exploration. Lacking great ready resources either of precious metals or of agriculture for a large population, the area remained, after its early start, as a relatively quiescent part of the Spanish Colonial empire. Only recently has it experienced sudden wealth, from petroleum in its far western coastal lowlands of Maracaibo and its eastern lowlands near the Atlantic.

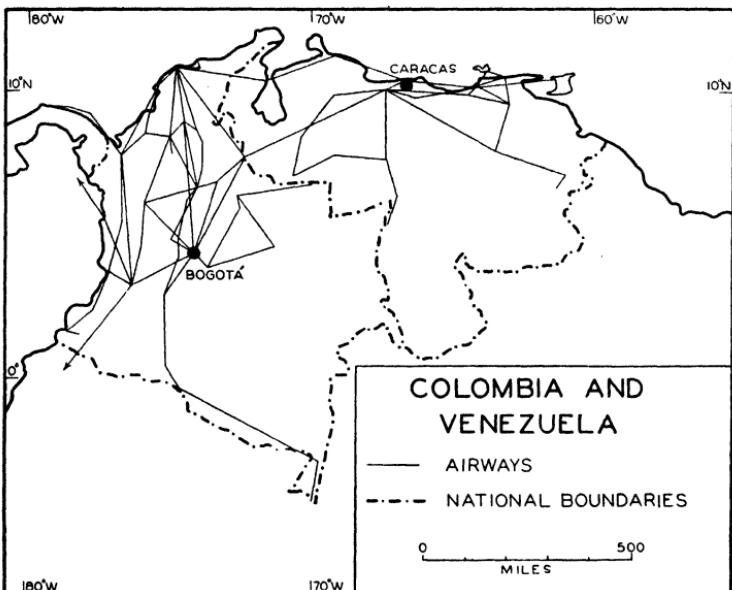


FIG. 167.—Air lines, supplementing surface transport, by express service in central areas, and primary service to isolated frontiers. 1940. Another phase of transport that could be followed further.

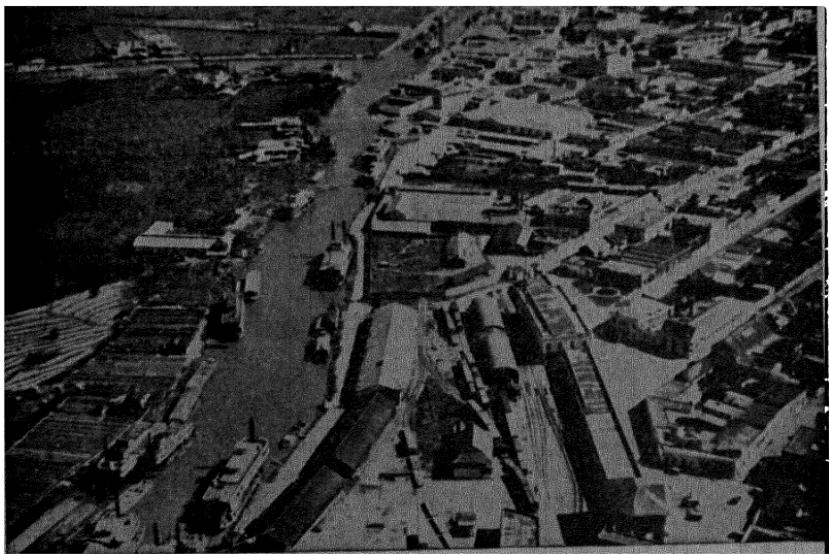


FIG. 168.—Barranquilla, port of the Magdalena River mouth. River boats in a water-front channel. Air view looking southeast, February, 1933.

**COLOMBIA.** In Colombia the larger, more productive and more populous highland core is far inland in the Andes, inconveniently remote from coastal interests (Fig. 168). Yet this fact does not seem to have been a decisive handicap in the development of the country. Petroleum in the coastal lowlands is an important but not a dominating national interest.



FIG. 169.—Bogotá, capital of Colombia. A plaza in the central part of the city, a business street in the right background, a hotel at the left. Altitude 8,700 ft. View looking west, February, 1933.

The core of Colombia is composed of several districts, each as populous and as separate from others as the several nuclei of the Central American countries. Political unity is based on a natural arrangement unlike Central America, where each country has its own ocean frontage: the separate districts of Colombia are grouped in a mass of highlands joined by having only one historic connection with the outside world, the Magdalena River (Fig. 168).

Highlands east and west of the upper Magdalena contain twin nuclei: in the Eastern Andes the high intermont basin of Bogotá, the capital, at an altitude of occasional frost in the *tierra fría* (Fig. 169); and in the Central Andes populous volcanic slopes and valleys in the frost-free *tierra templada*, noted for coffee and gold. Other districts deployed northeast and southwest along the Andes form secondary centers. Even areas in the Western Andes, almost within sight of the Pacific, formerly had

an outlet to the sea by way of the Magdalena; and some areas inland from the Andes in the Orinoco lowlands used the same outlet.

Now, in Colombia also a traffic revolution is occurring, though less by central plan than in Venezuela (Figs. 165, 166, and 167). Short railways penetrating land eastward and westward from the Magdalena and eastward from the Pacific meet almost inadvertently and, with the help of a highway link, form a usable system. The capital in the Eastern Andes has acquired a shorter and faster way to the sea across the Central and Western Andes than down the fitful river route. Thus Colombia has begun to face westward instead of northward, thanks first to the Panama Canal, which has made west equivalent to north.

Whether facing north or west the Colombian transportation pattern, including land, water, and air routes, has corresponded roughly with the national area. Now, under national planning, as in Venezuela, the national transportation system has come to serve the whole territory of Colombia in a still more unified way, by highways to a northeastern district heretofore facing Lake Maracaibo and far southwestern districts facing the Pacific (Fig. 166) and by airways to eastern and southeastern frontiers (Fig. 167).

Colombian transportation arrangements and changes have been conspicuous since before modern mechanization. In the Spanish Colonial Period a convergence of traffic on the Colombian corner of South America gave the area critical importance. This disappeared with the Spanish regime and is not recalled in the new order. The modern importance of Colombia is of a different sort, based on internal strength and productivity.

Both Venezuela and Colombia are vigorous members of the Latin-American family, with large potentialities of people and resources, from their northern shores to their southern frontiers. In the nineteenth century, great expectations for their material development were disappointed. But in the twentieth century, expectations have advanced toward realization, thanks to petroleum, coffee, the Panama Canal, and other less tangible factors, as the two nations gain headway in the stream of world events.

### Field Studies

The following Venezuelan and Colombian field studies illustrate regional characteristics rather than national distinctions. Like previous studies, they are not intended to furnish international comparison and do not provide equivalent views of the two countries. These fundamental aspects of occupancy serve as a background for regional generalization.

*In Venezuela.* The central core of Venezuela is an attractive and well-populated area of low highlands near the Caribbean coast. A glimpse

of the region is given in the traverse record of observation from the coastal port to the highland capital (3).

Much larger regions of sparse population and frontier disposition extend southward and southeastward from the coastal highland core of Venezuela: the Llanos extending from the coastal highlands to the Orinoco, the Guiana highlands south of the Orinoco, and the smaller but no less distinctive Delta at the mouth of the Orinoco. The study north and south of the Orinoco near Ciudad Bolívar (4) provides a glimpse of occupancy in the Llanos and observations of an hacienda within the Guiana highlands. Delta settlement is represented in the study of a farm at La Pastora (5).

Other regions, which have been more important in the life of Venezuela, extend westward from the central core of the country. The Maracaibo lowlands have been the principal seat of the petroleum industry, a new but powerful influence in the national development of Venezuela as a whole. Old style occupancy in the Maracaibo basin is represented by the goat-ranch study [6(a)], and new development by the oil field [6(b)].

The Venezuelan Sierras also are important—more important until recently than the lowlands at their foot, as a source of Venezuelan man power and export trade. The variety of occupancy in the Sierras is illustrated in the Motatán traverse (7) up through the lowlands of sparse occupancy, the valleys of tropical agriculture, the low highlands of specialized production, and the high highlands of subsistence farming to the paramo of sparse occupancy.

As already suggested, the field studies proceed from region to region without covering the political divisions in comparable fashion. Thus the Venezuelan studies deal mainly with outlying regions of the country, whereas most of the Colombian studies are of the central core. Such distribution in this case happens to illustrate regional variety fairly well, though it does not of course reveal the relative structure of the two nations. The Llanos and the coastal lowlands of Colombia are not included in separate studies; but their characteristics are represented in associated areas of Venezuela, and they are not forgotten in the generalizations.

*In Colombia.* The great complicated highland core of Colombia is better represented in the studies, and with good reason. The most populous and important high-highland district of Colombia, in the Eastern Andes, appears in the study of Hacienda Carmen, Sabana de Bogotá (8). The populous, important and productive highlands in the Central Andes appear in the studies in Antioquia: subsistence farms [9(a)], a coffee plantation [9(b)], and a gold mine [9(c)], all representative establishments. The most famous valley of the Colombian highlands, between the Central and Western Andes, appears in the Cauca studies.

Variety of environment is not segregated by districts. High highlands overlook the Cauca Valley, and the Indian subsistence farm [10(a)] is an example of high-highland occupancy at the lower margin of its area. Low-highland occupancy also overlooks the valley and is represented in the new coffee plantation [10(b)]. Finally, tropical-lowland occupancy, in the valley itself, is represented in the cacao plantation [10(c)] and the livestock haciendas [10(d)].

The only Colombian study not in the highlands is that in the far southeastern corner of the country, in the Amazon lowland region (11), an area shared with neighboring countries to the south and not with Venezuela.

### 3. LA GUAIRA TRAVERSE<sup>1</sup>

#### COAST RANGE, VENEZUELA

The coastal highlands of Venezuela rise like a mountain wall from the water's edge, leaving scant space for

coast in a beeline, though more than twenty miles by road or railway.  
SEAWARD SLOPE. In general, the

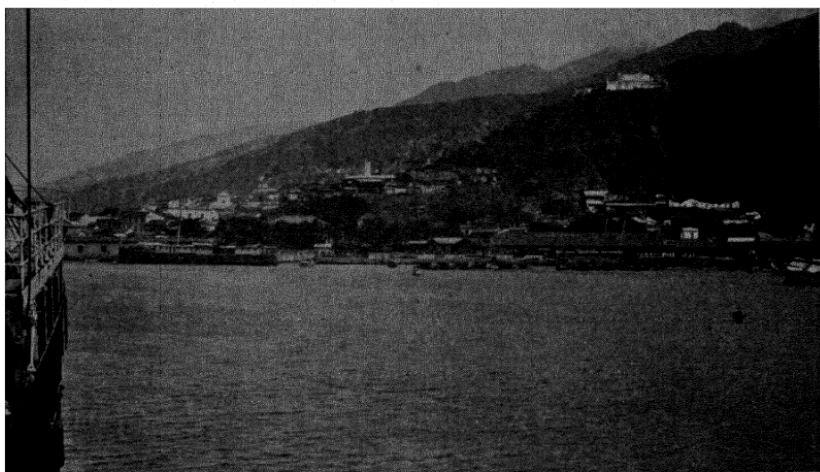


FIG. 170.—La Guaira, port at the northern foot of the coast range. View southeast across the harbor from the deck of a ship alongside the breakwater pier.

the port town of La Guaira at their foot [Fig. 163(3) and 170]. Up in the highlands the capital city of Caracas is only nine miles distant from the

mountain wall and the seacoast paralleling it are fairly straight. But in detail there are minor irregularities: a succession of rocky spurs reaching to

<sup>1</sup> Field work in February, 1922, supplemented by field work of Jay S. Seeley, particularly at Hacienda Ybarra, in March, 1940.

Although this is the first study in the chapter, it is given the number 3 to correspond with the study site in Fig. 163 (in which the two study sites in British Guiana as well as those in Venezuela and Colombia are indicated).

the sea and of intervening covelike valleys notching the range above and opening out below on bits of coastal lowland, particularly alluvial fans fringed by beaches and lagoons. The town of La Guaira occupies the foot of a spur; the road and railway climb inland up a small valley just west of the spur.

The aspect of the landscape suggests semiaridity. The mountain spurs are barely covered by low bush growth, brown during the long dry season. Alluvial slopes near shore are covered conspicuously by cacti, of organ and prickly pear types.

Signs of cultivation are few and far between: thin groves of coconut palms in a strip behind the beach, extending inland about three hundred yards; one field of sugar cane, less than twenty acres, presumably irrigated by water from the small valley; and a few patches of plantains, beans, and corn on smooth areas of alluvial fan. These spots are insignificant in a steep expanse of wasteland.

Far up the mountain slopes a darker shade of more luxuriant vegetation is visible. As the highway ascends over a thousand feet above the sea, it enters a cloudier area of scrubby woodland. Here land is used even less than near the shore, although a different sort of use is indicated by two or three small poor plantings of coffee. One drying floor near the road indicates that there may be more coffee higher up, not visible from the road.

**OVER THE RANGE.** The highway leaves the shoreward slope and ascends the little valley, winding along gullied valley slides, crossing and recrossing the railway. Vegetation in the valley is even drier and scantier than on lower slopes facing the sea. Bushes, cacti, and bare ground extend from top to bottom. The stream bed itself is dry; but there are several small green farms on bits of flood plain, where plantains, beans, and corn show signs of irrigation.

Only slight differences in landscape

appear as the road climbs up to a notch in the range, at an elevation of 4,200 feet. Beyond the pass on the inland side of the coast range is a broad expanse of upland, an intermont plateau or valley, between the coast range on the north and other ranges visible in the distance on the south, drained by the Rio Guaire flowing through from west to east. The city of Caracas lies close to the coast range at an elevation of about 3,000 feet, overshadowed by the highest summit, 8,900 feet.

The natural vegetation here also suggests scanty rainfall and a long dry season. Bushes, cacti, and small scattered trees clothe the slopes. But land use is widespread and conspicuous, not only in the city itself but also in the smooth uplands round about.

**SUGAR PLANTATION.** Haciendas of considerable size are characteristic of the rural area (Fig. 171). One of these is the Hacienda Ybarra, located just below Caracas where the Rio Guaire skirts the lower end of a mountain spur in the valley basin. The property includes not only the place where the river passes the spur, but also tracts of lowland on both sides of the river, both above and below the passage, and includes the spur itself.

The area of the hacienda is about a thousand acres, and its form is roughly rectangular, two miles long and a mile wide, extending east and west, traversed by the river from northwest to southeast and by the mountain spur from a high point in the southwest to its lower northeastern end.

The fertile lowland along the river comprises half the area, and the rugged uncultivable land of the mountain spur the other half. Sugar cane occupies most of the cultivable land, approximately 400 acres. Potatoes occupy 50 acres, and supply crops are grown by the laborers for their own use in small plots totaling 40 acres.

The number of laborers is about a hundred, all living on the property in their own houses and having some

livestock, chickens and goats, as well as their garden plots.

Ample water for irrigation is always available from the river, and cane

district grow sugar cane and are similar to Ybarra in size, land utilization, and operation. Specialization in alcohol distinguishes Ybarra from



FIG. 171.—An hacienda in the **intermont** plateau south of the coast range. Sugar mill in right center. View looking south toward interior ranges.

may be planted at any season. Tractors are used in cultivation. Harvest also is carried on through most of the year, and the cane is hauled in two-wheeled, rubber-tired oxcarts to a small but well-equipped mill at the end of the spur. The product is alcohol for the Caracas market. Potatoes are used as a supplementary source of alcohol.

Most of the other haciendas in the

other near-by haciendas, most of which produce brown sugar or rum for local consumption. But other characteristics, such as size, crops, equipment, and operations, are common to most of them. The livestock establishments and coffee and cacao plantations of Venezuela are mainly in other parts of the country.

#### 4. NUEVO MUNDO<sup>1</sup>

##### LLANOS AND GUIANA BORDERLAND

Two regions border on the Orinoco: the Llanos north of the river and the Guiana highlands south [Fig. 163(4)]. From the north bank, opposite Ciudad Bolívar, a road leads up out of the valley to the edge of an undulating upland 200 feet above the river, extending as far as the eye can see east, west, and north. This is not the

heart of the Llanos region, but an outlying part, locally called the *meseta*, or tableland, an area supporting little or no farming, few animals, and few rural people—at least, until the area became involved in the rush for oil.

**LLANOS.** Here the soil is sandy, and the grass thin and brown during a long dry season. Low scrubby trees

<sup>1</sup> Field work in February, 1923, supplemented by field work of Jay S. Seeley in April, 1940.

(chaparros) grow widely spaced over the surface. In some places, organ cactus also appears.

Small watercourses, marked by chaparro trees in denser stands, cut across the plain, particularly near the Orinoco

abandonment, a similar site on the same traverse shows signs of new settlement (Fig. 172). Here on the plain near a ravine is a squatter's hut with thatched roof, earth floor, a mud wall on the east side toward the pre-



FIG. 172.—Squatter's hut in the Llanos. Kitchen table under chaparro tree in the foreground. Ravine marked by line of trees in the background. View looking southeast.

valley. In these watercourses, gullied slopes are common, standing almost vertically and exposing deep beds of unconsolidated sediments, mainly sand and gravel mixed with silt and superficially cemented, gray or yellow above and red below.

Most of the small watercourses do not contain permanent streams or even springs. The few places where there are springs furnish the only signs of settlement. Probably the land far and wide is owned in large tracts, but there are no signs of large productive establishments. In a traverse of 10 miles from the Orinoco, only one small poor group of ranch buildings was seen, and that one apparently deserted. The site of the establishment was characterized by a spring in the head of a ravine.

In contrast with the evidences of

vailing wind, no shelter on the other three sides. Family furnishings consist of two hammocks, a storage box, a grinding stone, and cooking utensils at a fireplace under a tree. There are no crops, but an assortment of livestock, somehow sustained on the sparse natural vegetation: a few cattle, goats, razorback hogs, chickens, ducks, guinea fowl, and dogs. This establishment is more primitive and probably more temporary than the abandoned ranch but yet is alive.

**GUIANA HIGHLANDS.** From the open upland a view to the south includes rounded hills of the Guiana highlands, and a distant sky line slightly higher apparently than the plain of the Llanos. The Orinoco, skirting the highlands, in general draws a boundary between the regions, but not precisely hills and rocks of the

highlands are, here and there, on the north side of the river, and sediment and surface of the Llanos on the south side.

For example, at Ciudad Bolívar there is an outlying hill on the north

property is about 20,000 acres. The form is roughly a square, bounded by precipitous ridges on the north, streams on the west and south, and a roadway on the east.

The ridges, within northern

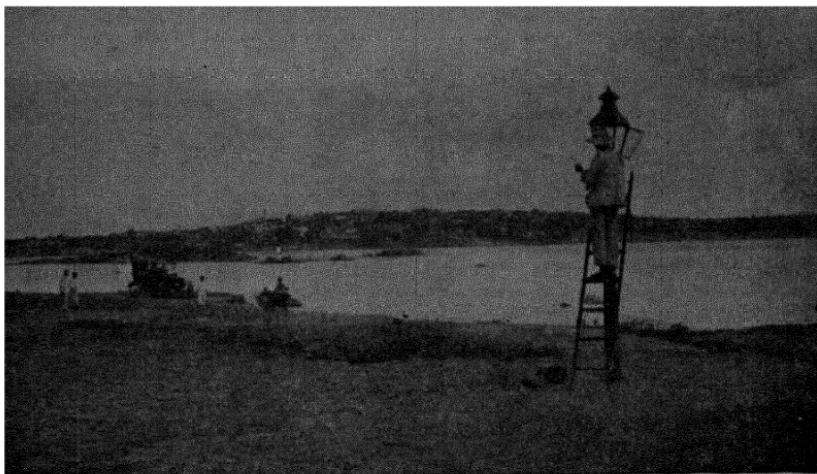


FIG. 173.—Ciudad Bolívar from across the Orinoco. The site of the city is a rocky hill of the Guyana highlands. View looking southeast.

bank as well as a rocky hill occupied by the town on the south bank; and the narrow channel between these two hills, in which the river cuts across the fringe of the highlands, gave the old name of Angostura ("narrow") to the town (Fig. 173).

Southward from Ciudad Bolívar beyond the immediate vicinity of the town the road traverses, for a short distance, an upland plain of sandy soil, dry grass, and chaparro trees, indistinguishable from the Llanos north of the river (Fig. 174). Three miles from the river a gradual ascent to higher land begins, and 10 miles from the river the road enters an area of hills, rocks, and woods.

HACIENDA NUEVO MUNDO is 17 miles south of the Orinoco in a hilly upland between two Orinoco tributaries (Fig. 175). The area of the

western areas of the property, are about three hundred feet high and covered with semideciduous woodland. Low areas along streams are occupied by denser, greener woods, including some conspicuously large trees and moriche palms. A major part of the area is occupied by rolling upland savannas of grass and scattered trees.

Massive crystalline rock appears in the landscape, in ridge-top and stream-bed exposures and in stones and boulders strewn on the savannas. The soil of the savannas is red in color and heavier than that of the sandy plains across the Orinoco. The grass is thicker and partly green even in the dry season.

Slight advantages of soil and vegetation are accompanied by signs of more stable occupancy. The hacienda has been maintained as a going con-

cern since Spanish Colonial times. At present, four hundred cattle, fifty

to market in Ciudad Bolívar (Fig. 176). These numbers are small for 10,000

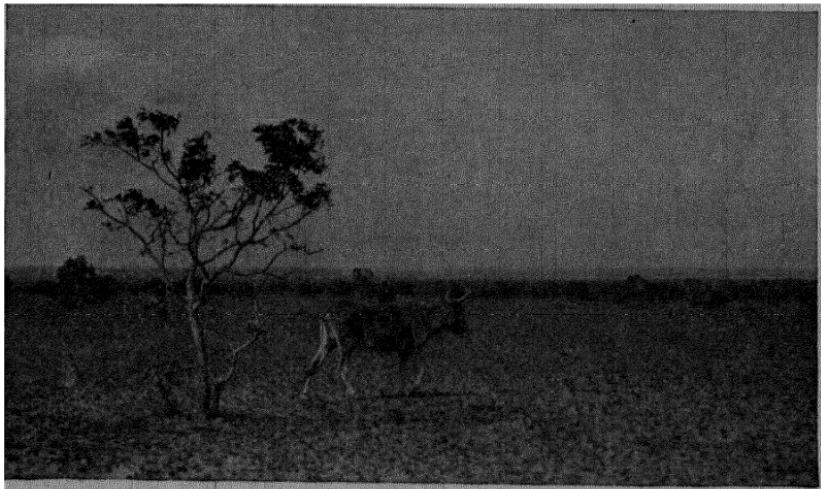


FIG. 174.—Poor pasturage for cattle in the Llanos in the dry season. An area south of the Orinoco. View looking north toward the river and the sky line of the Llanos beyond.

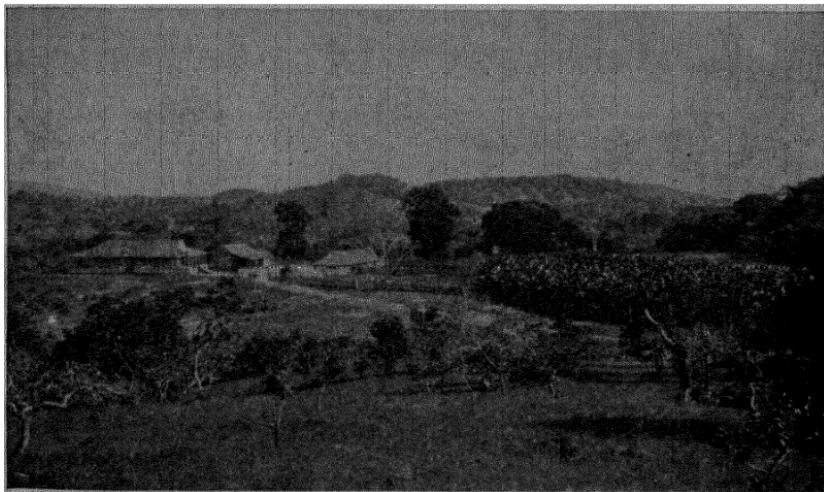


FIG. 175.—Hacienda Nuevo Mundo. *Casa grande*, corral, patch of plantains; savanna pasture in the foreground; wooded hills of the Guiana highlands in the background. The altitude is that of "lowlands," less than one-thousand feet above sea level. View looking south.

horses, and thirty burros are kept on the property, and about forty steers are rounded up and driven annually

acres of grazing land and do not represent the full capacity even of such low-grade natural pasture. Incentives

for intensive development are lacking; the quality of the pasturage is poor, particularly through the long dry season; the difficulties of livestock improvement are great and seem not to justify a change from the hardy

live in a substantial house located on a rounded spur overlooking open pasture lands, built as the *casa grande* more than a hundred years ago, of brick, tile, and timber produced on the property (Fig. 175).

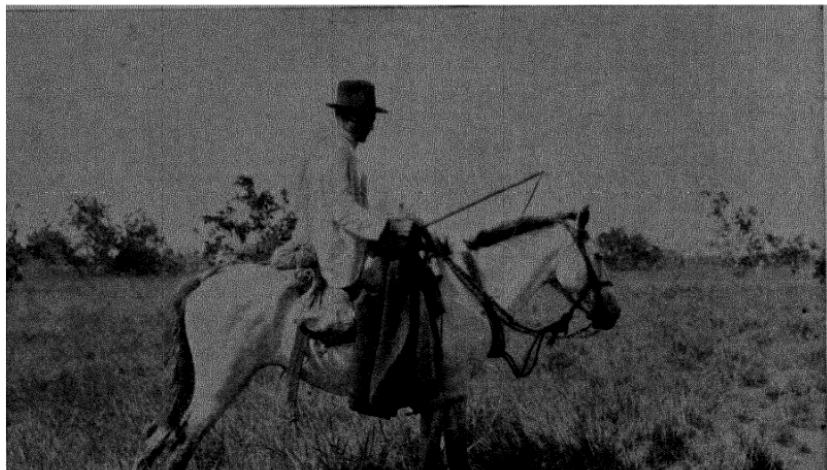


FIG. 176.—*Llanero* on the way to Orinoco market with cattle from Guiana hacienda.

low-grade Colonial stock already well-established; the local market is small and the foreign market hardly accessible except for hides.

There is a small amount of agriculture helping to maintain the establishment, though this does not contribute directly to the primary livestock interest. The hacienda has several cultivated fields on lower slopes. The crops are corn, plantain, cassava, beans, and other vegetables, yielding a food supply for domestic use and a surplus for sale in Ciudad Bolívar. In addition, small clearings are made by laborers of the hacienda in the woods on lower ridge slopes, for supply crops of corn and beans grown according to the simple practices of primitive shifting cropping.

Three or four laborers and their families live in thatched houses on the hacienda. The manager and his family

The present owner of Nuevo Mundo is a businessman in Ciudad Bolívar. For him the property is a country estate affording pleasure rather than profit.

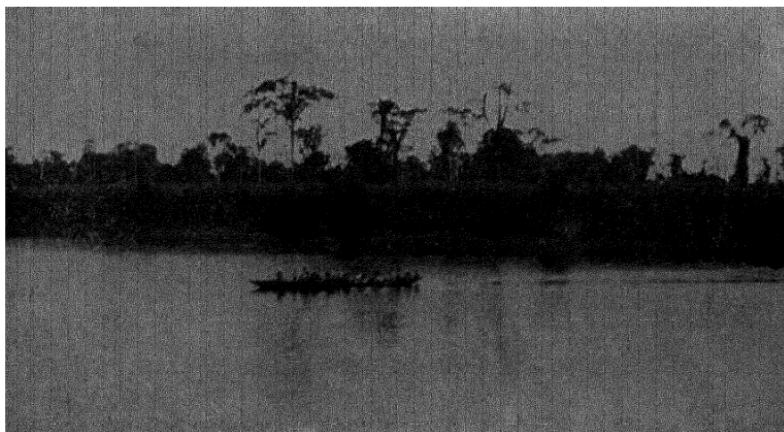
There is little prospect that the hacienda will become much more than this. The grasslands and croplands are used for what they are worth. The woodlands yield only a little timber sold locally and a few tonka beans contributed to the annual shipments from Orinoco forests. Valuable mineral resources are not to be expected, although Nuevo Mundo shares the mineral tradition of the Guiana highlands in possessing a primitive iron mine, long ago abandoned, important for Venezuelan settlers in an earlier period of local subsistence, and unimportant for world supply in the modern period of industry and trade.

## 5. LA PASTORA<sup>1</sup>

### A FARM IN THE ORINOCO DELTA

The Delta of the Orinoco is a well-defined area. A hundred miles downstream from Ciudad Bolívar the narrow valley between Guiana hills and Llanos upland comes to an end and is succeeded by an extensive alluvial low-

CACAO FARM. The largest farm has an area of sixty acres, of which about twenty acres are well-drained land in a strip five hundred yards long bordering the river. The soil is fertile brown silt loam. Most of the land is occupied by



**FIG. 177.**—Riverbank at low water in the Orinoco Delta below La Pastora. Cornfield along the natural levee; swamp forest beyond the levee in the background. Party of Delta Indians in canoe. View looking northwest from a river steamboat.

land, densely forested. The river is divided among numerous distributaries fanning out to the east and north and cutting the lowland into islands.

At the head of the Delta, where distributaries begin, the banks are 20 feet high at times of low water in the dry season [Fig. 163(5)]. Channels are bordered by natural levees, high at the river bank, sloping off gently to swamplands a short distance inland. The banks are occupied by sedentary settlers.

At La Pastora, on the Macareo channel, houses are scattered along the bank facing the river, and a continuous strip of farmland a few hundred yards wide from river bank to swamp extends along the channel (Fig. 177).

a grove of cacao, full grown, well developed, and well cared for (Fig. 178). The methods employed are those of established and satisfactory practice in the West Indies, including the planting of common leguminous shade trees, standard spacing, pruning, cultivating, harvesting, and drying. Special problems, such as injuries due to ants, are dealt with according to advice received from foreign sources. After harvest the crop is dried, bagged, and shipped by sailboat to market in Trinidad.

Supply crops occupy a little land on the river bank near the house. These include corn, cane, cassava, vegetables, and a variety of fruits: banana, orange, mango, breadfruit, and coconut.

<sup>1</sup> Field work in February, 1923.

The house is of light frame construction with thatched roof, mud plaster walls, and earthen floor. The farmer is a settler from the Venezuelan island of Margarita, and his wife is from the northern coast of Venezuela.

nearly forty miles. Those farther downstream appear newer and less developed, with younger cacao groves and more temporary crops. The last and lowest cornfield appears thirty miles inland from the sea, where the



FIG. 178.—Cacao grove of the largest farm at La Pastora. Pile of pods gathered from the grove, ready to be opened. Farmers and visiting Orinoco river passengers behind the pile. Cacao trees and farmhouse in the background. View looking northeast along the levee path.

Most of the other farms have about ten acres of well-drained land. Most of the other houses are similar, and most of the people are from Margarita. All have a similar assortment of crops, with cacao as the most substantial interest. On one farm there is a larger patch of sugar cane, a mill turned by oxen, and a kettle where brown sugar is made for sale in the community.

**LOWER DELTA.** From the head of the Macareo channel, farms extend along the banks intermittently for

bank is about five feet high at low water.

Below this point, unbroken forests line the shores. Near the river mouth, dry land is not to be seen, and the forests stand in water. Human occupancy is represented only by a few isolated huts elevated on piles above flooded banks, occupied by river Indians, who fish and gather mangrove bark and who travel by dugout canoe not only in the Delta but also across to Trinidad.

## 6. MARACAIBO BASIN<sup>1</sup>

### a. LA REFORMA GOAT RANCH

For this reconnaissance study the Maracaibo basin was traversed from

the northwestern to the southeastern margin, and special attention was

<sup>1</sup> Field work in February, 1933. R. S. PLATT, Pattern of Occupance in the Maracaibo Basin, in *Annals of the Association of American Geographers*, Vol. 24 (1934), pp. 157-178.

directed to the pattern of occupancy in two small areas. These two spots form an almost infinitesimal part of the basin area and are not typical of all of it. But they seem as typical as any two spots that might have been se-

this vicinity is the first of the spots studied on the ground. Hatico La Reforma is inland from the lake, about ten miles southwest of Maracaibo [Fig. 163(6)]. It is accessible by a cart road, quite unimproved but adequate

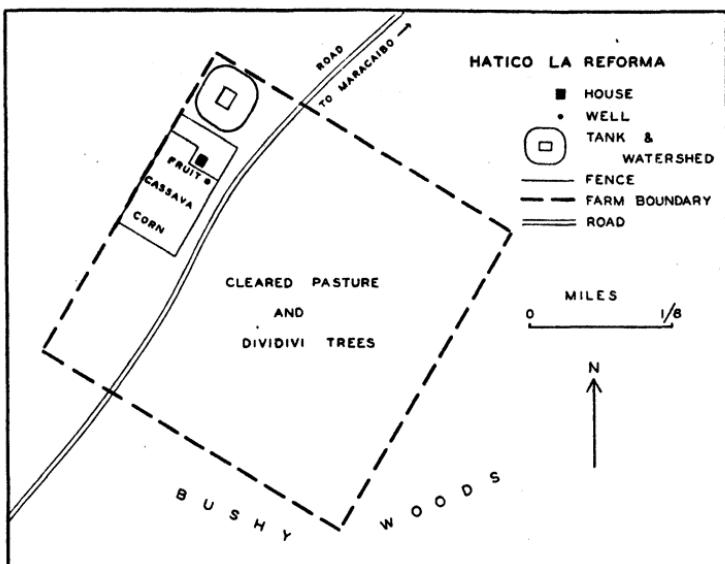


FIG. 179.—Land use in a goat ranch.

lected. Moreover, they represent not only two kinds of occupancy now present at different places, but also two stages in a sequence of occupancy—one old, the other new.

The field was entered from Colombia by airplane over the Sierra de Perijá. The region is too large to be viewed entirely from one point, but from the air the basinlike form seems perceptible—the rim of mountains, the belt of lowlands, and the central body of water. Dense forest on the mountain slopes, broken only by streams, gives way in the lowland to scrub woods, broken by openings or clearings increasingly numerous near the lake.

**RANCH SITE.** These openings indicate little ranches, each with an area partly cleared, a patch of cultivation, a small house, and a water hole. In

for the small amount of traffic over it in the undulating sparsely wooded plain. The district has aspects of semiaridity consistent with an annual rainfall of about 20 inches falling in a season of 7 months, average temperature of over 80°F. for every month, and rapid drainage through the sandy soils of partly consolidated coastal-plain sediments. This combination does not mean desolation necessarily. Mistletoe is as plentiful as cactus, and live animals are more in evidence than dead ones.

The size of the ranch is 62 acres (Fig. 179). Its clearing is surrounded by bushy woods, but the property adjoins that of other ranches. Beside the road that cuts across the property is a farmyard, or corral, enclosed by a picket fence. In this 1-acre enclosure

is the only building, a one-story stucco dwelling and storehouse formed of two compartments. Adjoining the farm-yard is a similarly enclosed 4-acre field, the agricultural part of the establishment. In it are irregular patches of cassava, corn, and beans.

surrounded by a broad embankment forming a basin to gather rain water. In the rainy season the tank receives enough water to last through the year. This is the watering place for livestock.

The rest of the property is pasture land, most of it cleared of bushes

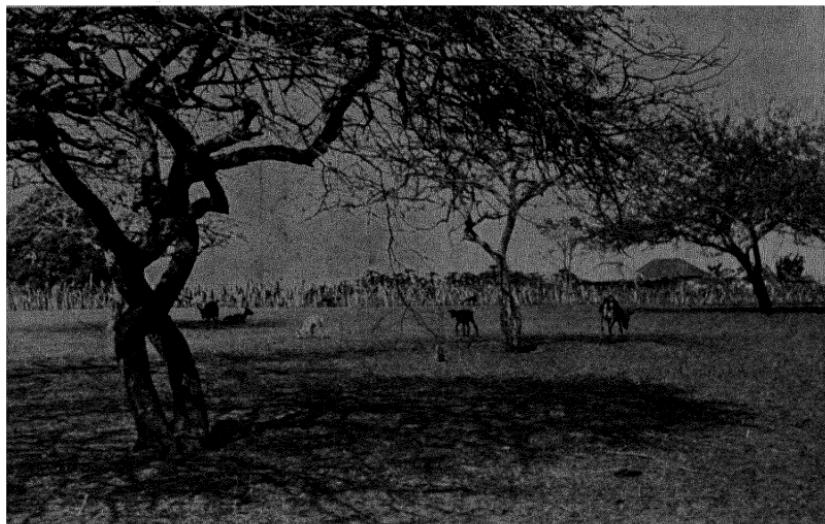


FIG. 180.—Divi-divi trees and goats in pasture, Hatico La Reforma. In the background the fenced enclosures, in which are visible the two-compartment house at the right, papaya trees in the center, and mango tree at the left. View looking northwest.

In the corner near the house is a deep dug well, and about this are a few fruit trees and nursery beds. The well is for domestic water supply. Irrigation is limited to watering young trees and nursery plants by hand in the dry season. Plantains and papayas and a single mature mango tree produce well; the field crops depending on precipitation yield fairly well in years when the rainy season does not fail. The land used for cultivation is not apparently different from its surroundings in soil or surface and is distinguished only by its location near the house, which in turn is located near the road.

On the other side of the house, outside the enclosure, is a water tank, a square hole dug in the ground and

and having a parklike aspect with an open stand of divi-divi trees and a sparse growth of grass (Fig. 180). The property is not fenced. Animals wander out into the bushy woods surrounding the cleared land but generally return to their own water hole. Probably a few are lost; exact numbers are not known. There are about fifty goats and kids, two cows, one burro, and a few pigs and fowls.

**RANCH ECONOMY.** Goats are the principal product of the ranch. They do not give a significant amount of milk, and it is for their skins and meat that some goats and kids are driven occasionally to Maracaibo to be sold.

A second cash product is divi-divi, pods of the prevalent leguminous tree of the area, valuable for their content

of tannic acid. These are gathered in the dry season by all the members of the household and stored until sold to a dealer and carried to Maracaibo.

La Reforma is an old establishment. The owner is a Venezuelan of Spanish

LAKE VILLAGE. In the vicinity of La Reforma the most striking contrast in landscape is seen at the lake shore. The next field-study site is on the shore at Lagunillas; but, before passing across the lake to this site, mention



FIG. 181.—Water front of Santa Rosa, on the west side of Lake Maracaibo outlet. Coconut palms on beach land, fishing boats moored offshore. View looking northwest from a landing place.

descent with some Indian blood. His family is large, having somewhat the aspect of a harem. Apparently these people find the property sufficient in size and in attached resources for their support. The pattern of the ranch seems to be such as to attain this objective.

The family is not isolated or peculiar. There are neighbors within a mile, and the establishment is like others in the vicinity. Elsewhere in the region there are differences, including less rainfall in the northern and greater rainfall in the southern part of the basin; but signs of semi-aridity are widespread, having been observed under similar eustrophic conditions at the tip of the Goujira Peninsula a hundred miles to the north and at the base of the Andes a hundred miles to the south.

may be made of another lake-shore place as a transition from La Reforma to Lagunillas. At the shore village of Santa Rosa, rural occupancy is nearly as simple as in the ranch area though households are more concentrated and resources are different. Goats and divi-divi are almost if not quite supplanted by fish and coconuts (Fig. 181).

Santa Rosa is older than La Reforma. It may even have been one of the lake villages that gave the name of Venezuela (Little Venice) to the country, at the time of Spanish discovery.

Such a building site has some disadvantages. For example, near the outlet the lake water is brackish, and fresh water is obtained only at some distance on shore from holes dug in sand. But in general this distinctive

form of settlement is one befitting local circumstances, here where the shore is low and overgrown, the water calm and shallow, and where simple pile

construction provides a more healthful home on water than on land, with relative security from insect and other enemies.

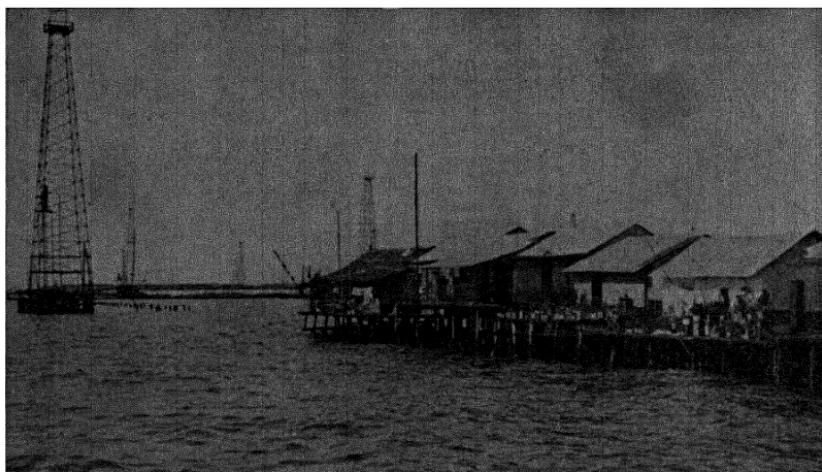


FIG. 182.—Water front of the village of Lagunillas. Oil wells at left. View looking north from a village pier.

#### *b. LAGUNILLAS OIL FIELD*

Across the lake at Lagunillas, a similar village arrangement appears (Fig. 182). But in this vicinity there has been a radical change in occupancy. Petroleum has diverted attention from the old foundations and modes of human activity. Coconuts and divi-divi remain only as part of the scenery (Fig. 183)—at least, so they appear to outsiders if not to the indigenes. Lagunillas is the site of the greatest oil field in Latin America, producing 50 per cent of the Venezuelan output and 4 per cent of the world output in recent years (Fig. 184).

The village is not old in its present form. It has been swept by fire thrice since the arrival of oil in 1926. Care is taken to prevent any spread of oil on the water around and below the village.

Otherwise the settlement is less changed than might have been ex-

pected. Lagunillas is still a village of shacks, fairly detached, if not unconscious of the phenomenon that is growing and buzzing around it, an alien phenomenon like an excrescence drawing in previously unknown people and things from the outside world and drawing up previously unknown resources from below.

The imported personnel of the oil field, bringing its own equipment, has applied a foreign technique to local problems and developed in a standardized manner a functional pattern befitting the local situation. The pattern reflects local conditions at the earth's surface and below and above.

**WELL SITES.** The oil wells themselves are basic items in the pattern. There are 622 of them, of which 612 are productive and 10 are abandoned. Most of them are distributed evenly or almost evenly in a sharply defined

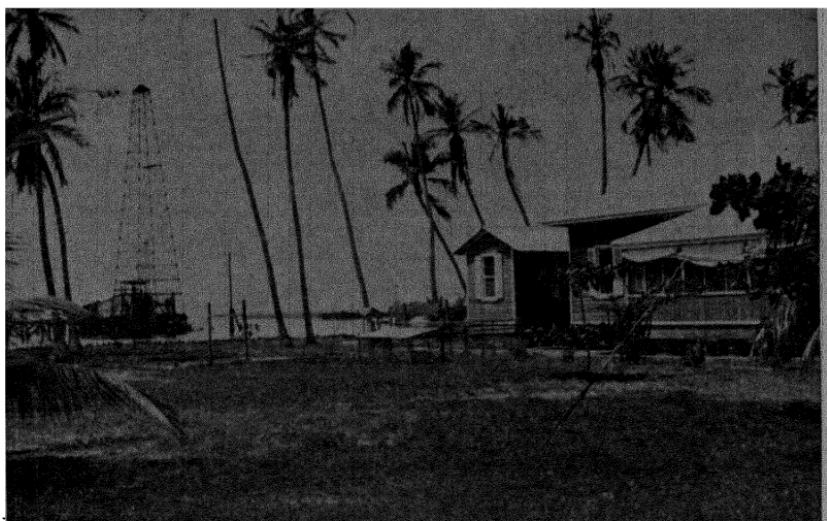


FIG. 183.—House of one of the supervisors, Lagunillas Field. Coconut palms along shore. Oil wells offshore. View looking northwest.

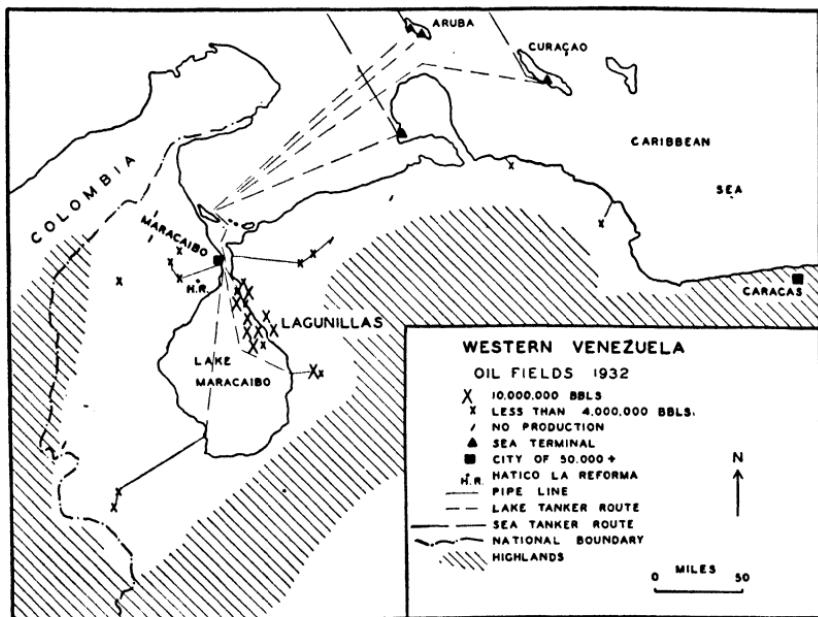


FIG. 184.—Lake Maracaibo oil fields, tanker routes, and island refineries. Production has been maintained on a similar scale through recent years, and the map represents the general distribution during the decade.

elongated area. A few are scattered beyond the central group (Fig. 185).

Subsurface structure is reflected in this distribution. The oil occurs at

distance of 1,000 feet apart is increased where the oil sand is thin and lean and decreased where it is thick and rich. The scattered outlying wells are

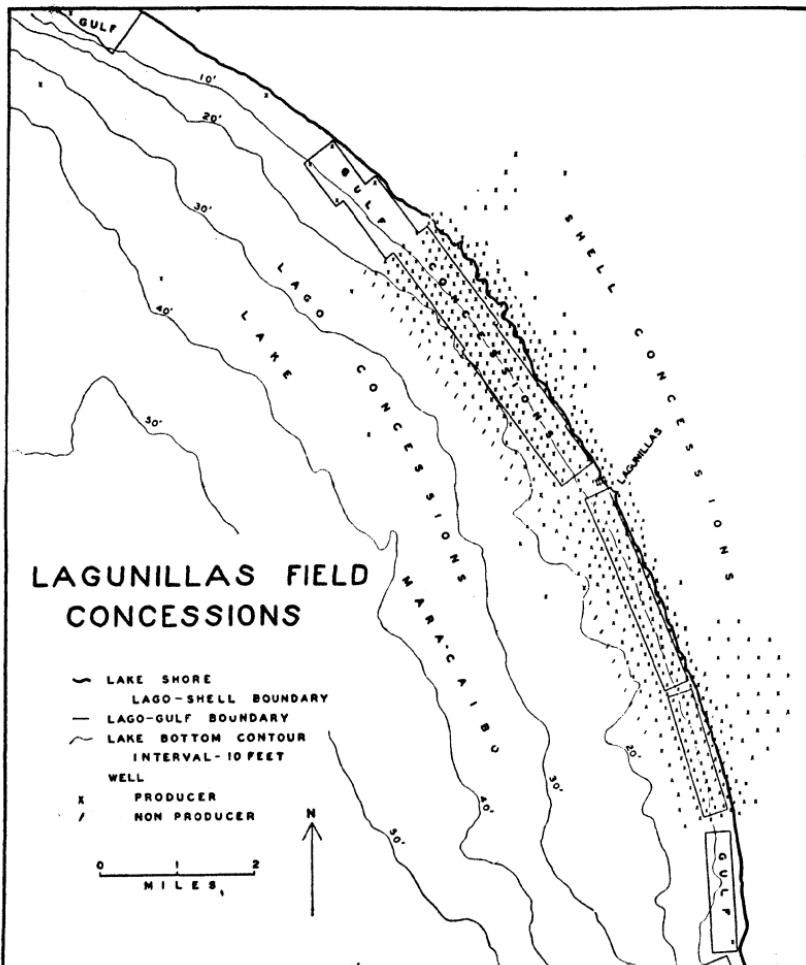


FIG. 185.—Distribution of wells in Lagunillas concessions. Unfinished wells are included as nonproducers.

depths of 3,000 to 5,000 feet in a minor anticline of Miocene sand within the Maracaibo basin geosyncline. The wells are clustered in a proven area. Their spacing is calculated to extract the resource efficiently. A normal

exploratory, in areas not drilled up for production.

The cluster of wells does not coincide with the anticline in form and orientation, although there is a rough correspondence. The cluster follows more

precisely the trend of the lake shore in a curve averaging N. $30^{\circ}$ W. This happens to lie approximately but not exactly over the axis of the anticline, which trends N. $20^{\circ}$ W.

**OIL CONCESSIONS.** This orientation

of oil-drilling possibilities in water as well as on land, separate concessions were granted: (1) all the land to the water's edge; (2) certain blocked out areas in the lake near the shore; and (3) all the rest of the lake.

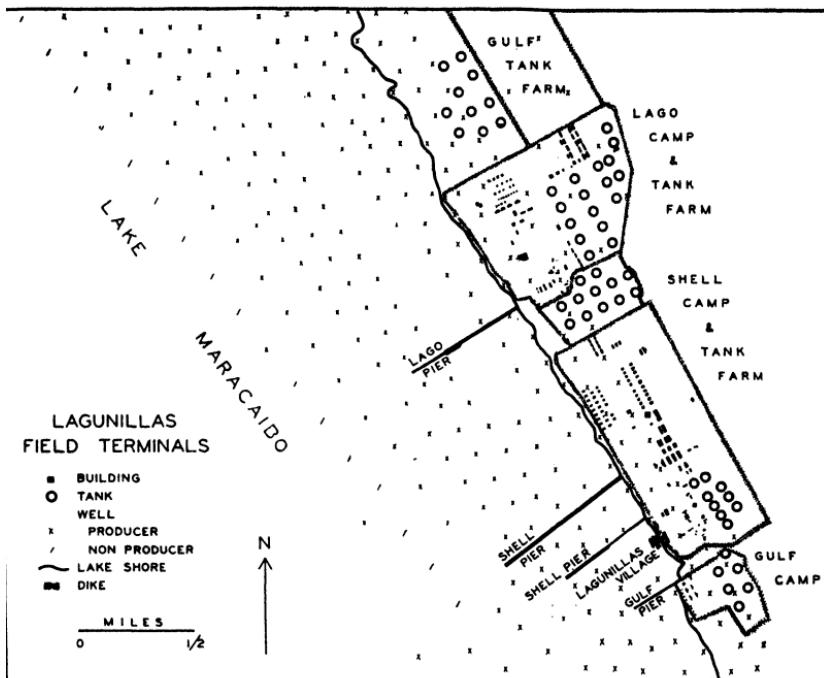


FIG. 186.—Field terminals of the three companies on Lagunillas shore.

of wells in accordance with a surface form rather than subsurface structure is not evidence of direct relationship between the location of the wells and the nature of the surface. The wells are spaced systematically without regard for any differences in land or water. No natural feature either favors or interferes with the placement of a well. But indirectly surface features are important in the location of wells because these features were used in defining concessions. Owing to familiar differences between land and water in surface occupancy and perhaps also owing to a progressive appreciation

Separate petroleum interests have acquired these concessions, and now the opening of the field has been marked by offset drilling along concession margins. The Royal Dutch Shell Company controls all the land and has drilled two rows of wells along the shore. The Gulf Oil Company of Pennsylvania controls the rectangular blocks near shore in the lake and has drilled two rows of wells along each side of these concessions. Because these are narrow strips, the offset drilling has almost covered them with wells. Finally the Lago Company, subsidiary of the Standard Oil Company of New

Jersey, controls all the rest of the lake and has drilled two rows of wells, outside the concessions of the Gulf Oil Company and the land concessions of the Shell Company (Fig. 185).

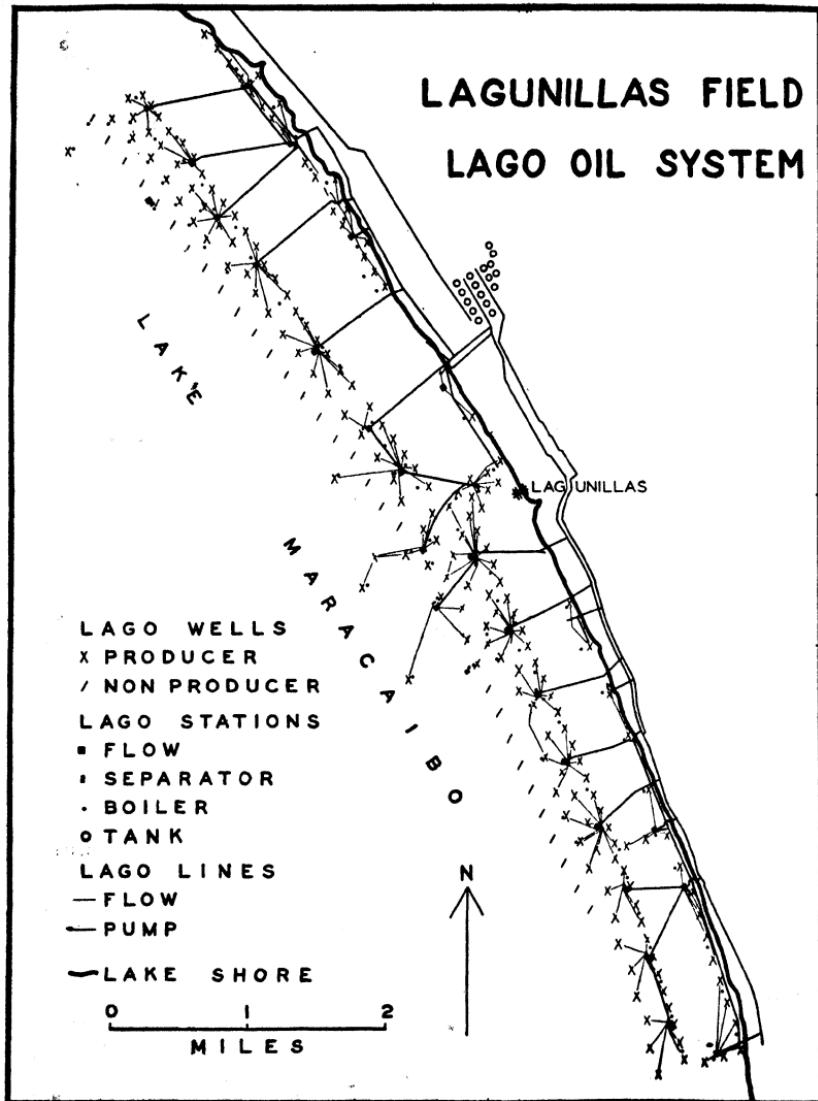


FIG. 187.—Oil pipe system of the Lago Company.

Company in the lake, and irregular rows of wells in shoestring areas left over between the offshore blocks

That the present pattern is only a preliminary stage is indicated by the fact that exploratory wells have proved

successful in the Shell concession inland  $2\frac{1}{2}$  miles, to an apparent limit of production, and in the Lago lake-bed

restricting operations for the time being. Along the shore the area of large production extends about 8 miles.

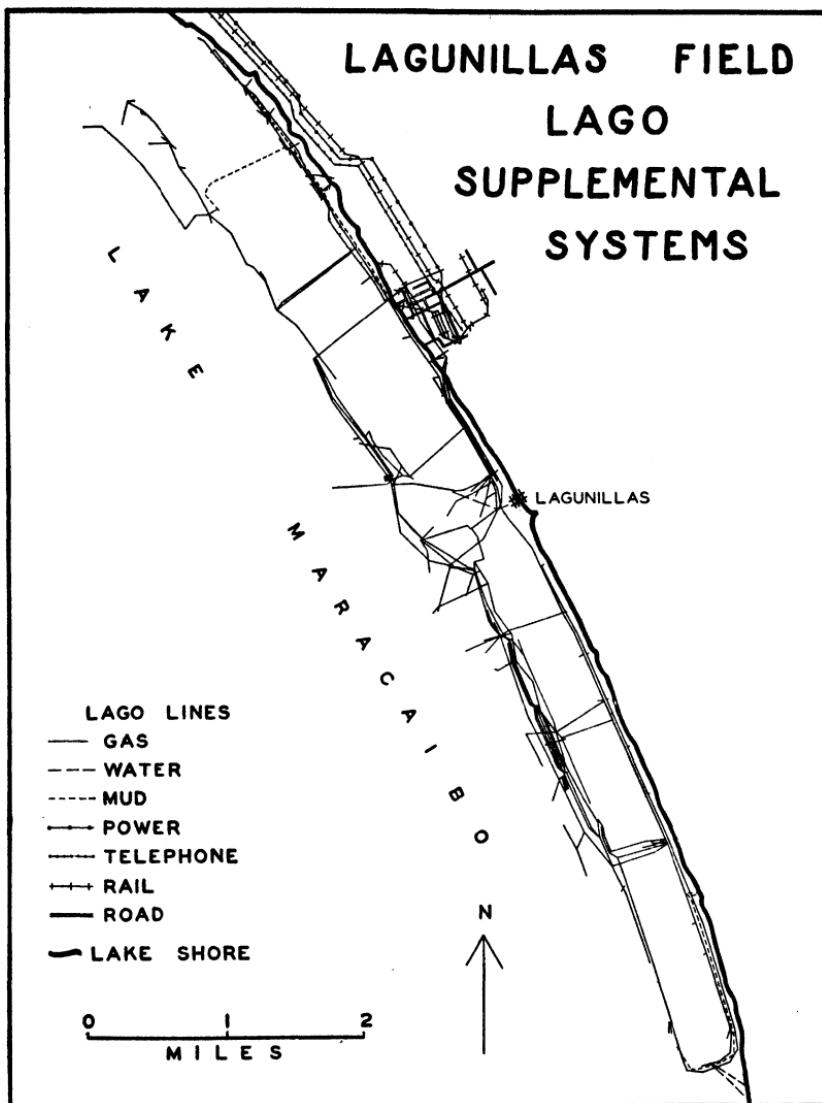


FIG. 188.—Other pipe, wire, and road systems of the Lago Company.

concessions out into the lake  $2\frac{1}{2}$  miles, not to a limit of possible production but to a water depth of 35 feet,

The competitive development of the field involves much more than the distribution of wells. Each competitor

has its own camp and tank farms, triplicating each sort of building (Fig. 186). Because these are on shore, they are all necessarily in the area of Shell concessions, and Shell wells are distributed not only through their own

tank farm for storage and ultimately to the pier for shipment by tanker.

Many of the flow stations are accompanied by gas separators, distributed at these primary focal points to relieve the oil of its gas content before pump-

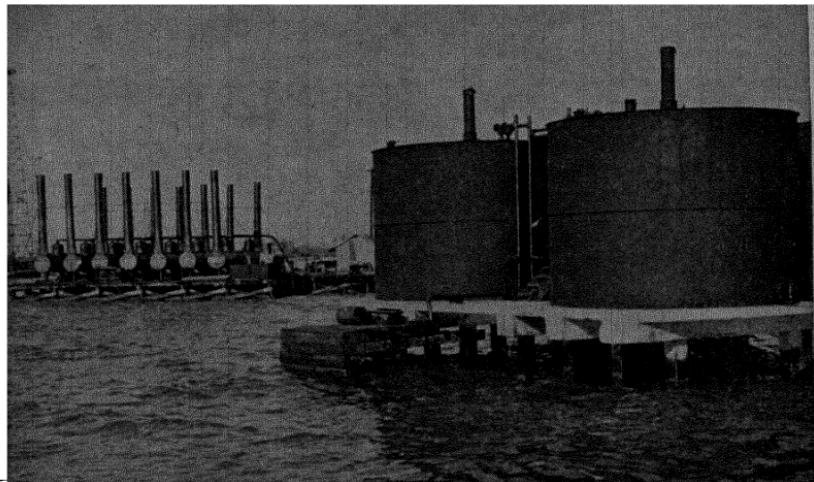


FIG. 189.—Lago absorption plant in the lake. Shore visible in the far background.

camp but also through the Lago and Gulf camps. Subsurface rights are separate from surface ownership.

**WORKING PATTERN.** The whole pattern of field equipment fits into these local circumstances of production area, concession boundaries, and land and water. Some of the complexities of the pattern are illustrated by the Lago system of wells, lines, and focal points (Figs. 187 and 188).

There are 199 Lago wells. All that have been completed are producers. Most of them flow naturally; a few are on gas lift; none is pumped. Pipes from individual wells focus on 27 flow stations in the lake, each centrally located with reference to about eight wells. The arrangement is symmetrical in the lake-bed area but cramped near shore between Gulf and Shell concessions. From the flow stations, oil is pumped ashore in trunk lines to the

ing it ashore. The gas is piped separately to an absorption plant of which there are two in the lake (Fig. 189), each centrally located with reference to about half the separators. Here the gasoline content of the gas is recovered, and dry gas is pumped back through a system of pipes into the wells that are on gas lift (Fig. 188). Because the Lago Company has a surplus of gas for this purpose at Lagunillas, some of it is piped to an older field twenty miles to the north, where the supply of gas for Lago wells is insufficient.

Boiler stations also are distributed in the lake to supply power according to the needs of the several establishments. Placement of the various focal facilities in the lake minimizes transportation mileage by consolidation of pipe lines and avoidance of return movement.

The establishments placed on land are only those with larger space

requirements, of greater focal range for the whole field, or depending on land resources, such as housing facilities for the personnel (Fig. 183), offices and workshops, storage tanks and yards, and mud pits.

pany, operating to greater depths. The order of concessions implies as much. But, as a matter of fact, the contrary seems to be true. Shell operations on land involve the clearing of woods and building of roads. On well-drained land

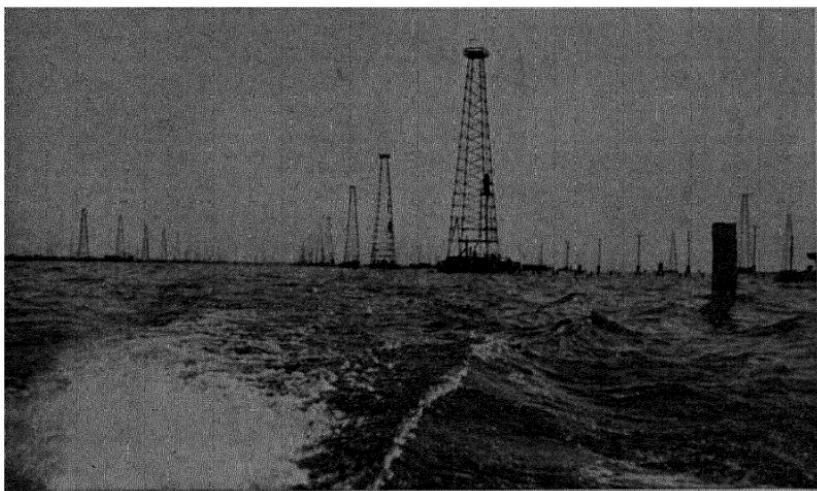


FIG. 190.—Rows of wells along concession boundaries in the lake. View looking southeast from a motorboat, Lagunillas Field.

These establishments are served by appropriately localized lines of transportation and communication: water pipes from the lake, railway and telephone connections with the older field to the north, a power line from a central plant, and in camp a small, dense network of roads, tracks, pipes, and wires.

The complexity of the pattern is multiplied when to the Lago network of lines and focal facilities are added the equally complete networks of the other companies, of the Gulf Company along the border of the lake and on land and of the Shell Company entirely on land.

The position of the Shell Company on land has a suggestion of superiority in comparison with the Gulf Company operating in water to a depth of 15 feet and the Lago Com-

the vegetation is not dense, but much of the area is swampy and covered with a tropical tangle ordinarily called "jungle." At best, mobility is not easily attained. Conditions of work include such adverse factors as ants, mosquitos, and other pests.

The Gulf Oil Company avoids these difficulties and is faced only with the lesser problems of working on bridges or in shallow-draught boats. The Lago Company enjoys even better conditions, with most of its wells in water deep enough for the free use of boats. The lake is generally calm, and boat work, though somewhat slow, is economical. Well platforms and other permanent structures are built on concrete piling. Thus conditions that favored the lake villages of "Little Venice" seem to be reflected again in the oil field (Fig. 190).

Working conditions are not the chief advantage of the Lago Company. A higher average production from wells in the lake-bed concession is of more importance. The Lago Company produces one-half of the field output from less than one-third of the active wells.

Meanwhile, another difficulty has appeared to handicap land operations. Rapid local subsidence is causing the flooding of land by lake water along the shore and by streams on the landward side of the field. The camps, on low land, were already partly protected by dikes; but these are becoming inadequate, and improvement and extension are needed. The Dutch Shell Company is the chief sufferer, although both the Gulf Oil Company and the Lago Company are affected by reason of their camps and the sinking of their lake platforms. The oil industry suffers slightly from another

natural phenomenon, an unusual frequency and violence of local thunderstorms noticed particularly since the development of the field.

Details need not be multiplied to illustrate further the complexity of the field pattern and of its functional activity. In general, the development of the district is relatively simple; people and things have arrived and fixed themselves upon the area for the exploitation of a single resource, and from the area a single commodity flows out. The crude-oil product is shipped by lake tankers to Maracaibo for clearance and at high tide out over the bar with a draught of 11 feet to the deepwater terminals of the Gulf Oil company on the Paraguaná Peninsula, the Shell refinery at Curaçao (Fig. 130, page 149), and the Lago refinery at Aruba, for shipment beyond in ocean tankers or distribution in finished form to world markets.

## 7. MOTATÁN TRAVERSE<sup>1</sup>

### VENEZUELAN SIERRAS

A traverse by the best established route from Lake Maracaibo into the Andes [Fig. 163(7)] starts at the port of La Ceiba, a village crowding down to the lake shore and projecting out over the water in typical lacustrine style, as if pushed out of the forest, as is indeed the case, in a sense (Figs. 191 and 192). The only significant function of the village is to transfer cargo from land to water, or vice versa, cargo coming from and going to invisible places beyond the horizon—the Andes more than forty miles across the lowland to the south and Maracaibo more than one hundred miles across the lake to the north. A pier for lake boats projects out farther than other parts of the village, and from this a railway starts for the mountains (Fig. 192).

**FOREST ZONE.** Behind the village

<sup>1</sup> Field work in February, 1938,

the railway plunges promptly into forest, a fairly luxuriant tropical swamp growth, uninhabited. The formation is edaphic (dependent on soil conditions) and is distinctly not selva. On better drained land the vegetation is less luxuriant, showing signs of a dry season in brown foliage and leafless branches. On sandy and gravelly land of rapid drainage, where the Andean foothills are approached, there are parklike grasslands with scattered chaparro trees, like the Llanos on the other side of the Andes. In this setting near the foothills is the first, almost the only, agrestic settlement along the railway, Sabana Mendoza, a small center of livestock ranching [Fig. 191(1)]. Here are a few haciendas of the characteristic tropical savanna type, in which the first steps in livestock production are easy, with

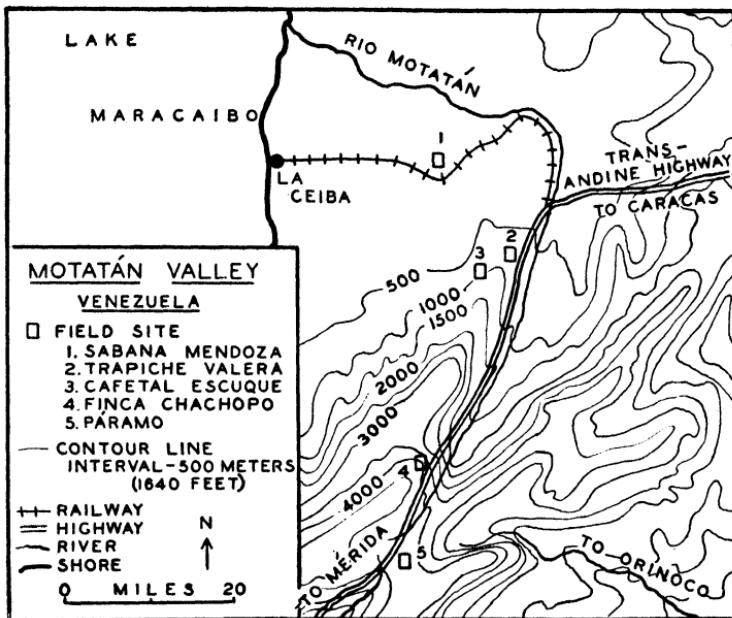


FIG. 191.—Traverse route from Lake Maracaibo to the head of Motatán Valley. (*Contours from American Geographical Society compilation.*)



FIG. 192.—La Ceiba village water front. Lake Maracaibo steamboat at the pier in the background. View looking southwest.

scrub cattle wandering in unfenced natural pastures and producing small quantities of low-grade beef and hides, but in which further steps to improve production by planting, fencing, breeding, dipping, and other modern prac-

burn a clearing in the forest, raise two or three crops of corn without tillage, then abandon the depleted, weed-choked land to be reoccupied by forest, and clear a new farm site. Thus, agriculture in this case seems



FIG. 193.—Cane fields of Trapiche San Miguel. Worker at right cutting and stripping cane; burro carrying load to mill. View southeast across valley to bushy slopes.

tices are difficult or economically impossible. At Sabana Mendoza, pastoral life goes on in the leisurely and fairly satisfactory unimproved way. The daily train stops for water and then proceeds up the valley of the Motatán River.

The lower course of the valley, through mountain foothills, is marked by tropical forest that is not uninhabited. The occupancy is that of shifting, or milpa, cropping and is as sparse and elementary as that of ranching in the savanna. In fact, it is deservedly called more elementary in most ways, for it is not organized permanent occupancy by large land-owners of white extraction, but small-scale temporary occupancy by squatters of Indian extraction, who cut and

more nomadic than grazing. But over a period of years the movement of crops is probably no greater than that of livestock from pasture to pasture, and the cycle brings a similar rotation in land use.

**FARM ZONE.** In ascending the valley the railway barely emerges from the lowland forest zone before coming to an end at an elevation of 1,100 feet in the village of Motatán. At this point the climb into the mountains is continued by a highway, and the village function is transference of cargo, as at the port.

Here begins the zone of intensive sedentary commercialized tropical agriculture, extending on up the valley for 40 miles between the elevations of 1,100 and 6,800 feet. Steeper slopes

of erosion are occupied by grassy or bushy pasture or by tangled woods. Houses and cultivated fields are gathered in valleys and on lower slopes. Smooth land is provided by natural

with the main valley, at an elevation of 1,800 feet. Only a brooklet flows in the *cañada*, which above this point has been abandoned by a tributary river now reaching the Rio Motatán

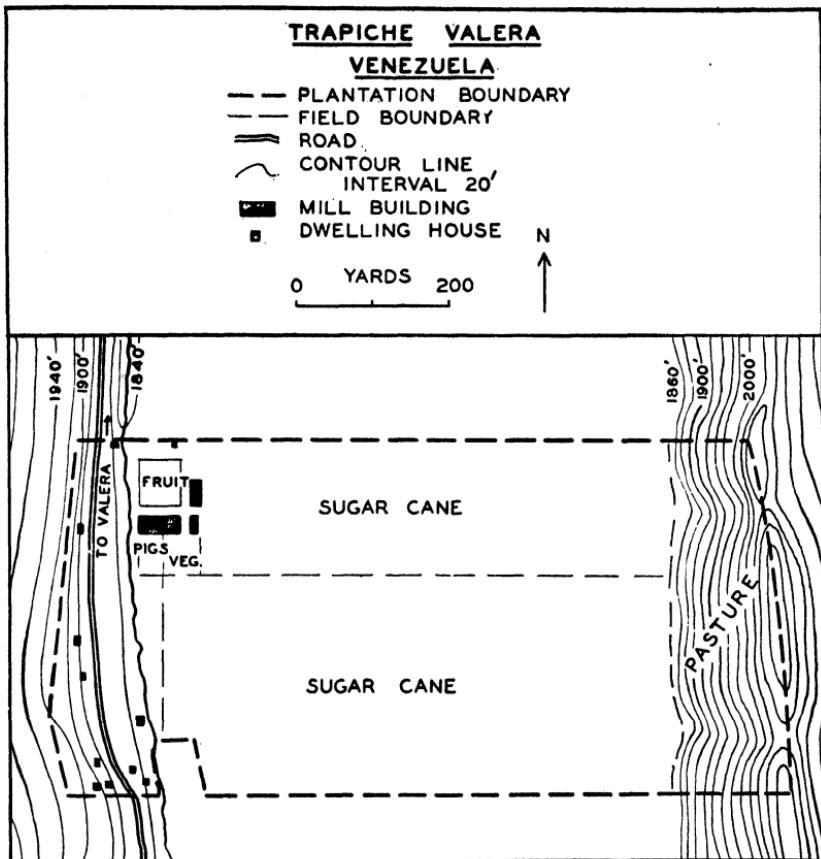


FIG. 194.—Pattern of a sugar plantation, Trapiche San Miguel.

terraces, high and low, apparently remnants of valley trains in some cases, not everywhere fertile, but generally inhabited. Villages occupy minor points of vantage, and an active urban center, Valera, gives coherence to the district.

**SUGAR PLANTATION.** The Trapiche San Miguel is one unit of rural occupancy [Fig. 191(2)]. It is near Valera in a *cañada* just above its confluence

via a shorter route, through a gap probably cut by lateral planation. The bottom land is terracelike—smooth, undissected, well-drained, silty, about a half mile wide (Fig. 193).

The *trapiche* property, 79 acres, is a strip across the valley plain and up the steep slope on either side (Fig. 194). Sugar cane occupies most of the smooth land, 57 acres. Moderately high tem-

peratures all year and a season of moderate rainfall furnish the requisite conditions for cane. The rainfall is less than the optimum, but water is available for supplementary irrigation. The brooklet is in fact an irrigation stream diverted from the tributary river farther up the valley. The *trapiche* is one of five properties sharing the water rights from this flow, receiving its allotment during 6 days of every month in the growing season.

During the latter part of the dry season, little or no water is available. This is not a hindrance to cane growing in view of the seasonal requirements of the crop. But the periodic flow of water is responsible for a special modification of productive rhythm. A water wheel turned by the irrigation stream provides power for the sugar mill. Therefore harvesting is continuous through the wet season and intermittent at the time of water shortage in the dry season, reversing the practice common elsewhere of harvesting during a drier period when sugar content is higher and transportation easier. Here the rainy season is not so wet as to reduce sugar content unduly, and the plantation is so small that field transportation is not a serious problem.

The harvest crew consists of four men to cut cane and five men to transport it to the mill on pack burros (Fig. 193). Because the mill is close to the fields, the distance is only a few rods at most, and each of the 11 burros is able to make about twenty trips in a day. The mill is a piece of nineteenth century machinery, of a size commensurate with that of the plantation, and typical of all mechanized sugar districts formerly and of outlying districts now.

The cultivation of the crop is in accordance with common practice in tropical regions of commercial but not intense development. Ox plows and harrows are used before planting, and hoes to keep down weeds during the early growth of the crop. The period

of growth is 12 to 18 months. Machetes are used to cut the cane. The product of the mill is panels (unrefined brown sugar in cakes), sold in Valera and consumed in the district.

In addition to the cane fields the plantation has 19 acres of pasture, up on the uncultivable valley slopes at opposite ends of the property. This, together with the fodder of cane leaves, makes ample provision for an assortment of livestock including cows as well as oxen and burros. There are also pigs, fed on molasses, and poultry foraging around the houses. A few fighting cocks are reared as a hobby.

Three acres around the *casa grande* are occupied by orchard and garden producing a supply of papaya, plantain, cassava, and vegetables.

Active management is in the hands of the major-domo, a Venezuelan Negro. The owner, a white Venezuelan, lives in Valera, devoting his attention to a small store, exemplifying thrift rather than latifundian idleness.

Other similar plantations occupy tracts here and there where the valley is relatively broad and fertile, conspicuous among less organized and less intensive subsistence farms. Farther up the valley are cane fields in which trees are growing, scattered survivors of a former coffee-plantation shade cover. Apparently, sugar for domestic consumption has encroached on coffee for foreign export. At least, coffee has become localized in favorable districts at higher elevations.

**LOW HIGHLAND.** Though still within the zone of tropical agriculture the higher elevations are unlike the lower part of the zone in never having extreme desiccating heat and therefore in providing different conditions for plant growth and human health. The common distinction between *tierra caliente* (hot lowlands) and *tierra templada* (low highlands) cuts between the sugar plantation, below 2,200 feet elevation, and the coffee plantation

above. This classification draws a boundary within the zone of tropical agriculture and does not provide a lower boundary at about 1,000 feet, the lower margin of the agricultural zone, to distinguish it from the non-

very hot and never frosty. The rainfall is seasonal and slightly greater than that lower down in the valley.

**COFFEE PLANTATION.** Hacienda del Rio is on the slope below the town extending down to the tributary

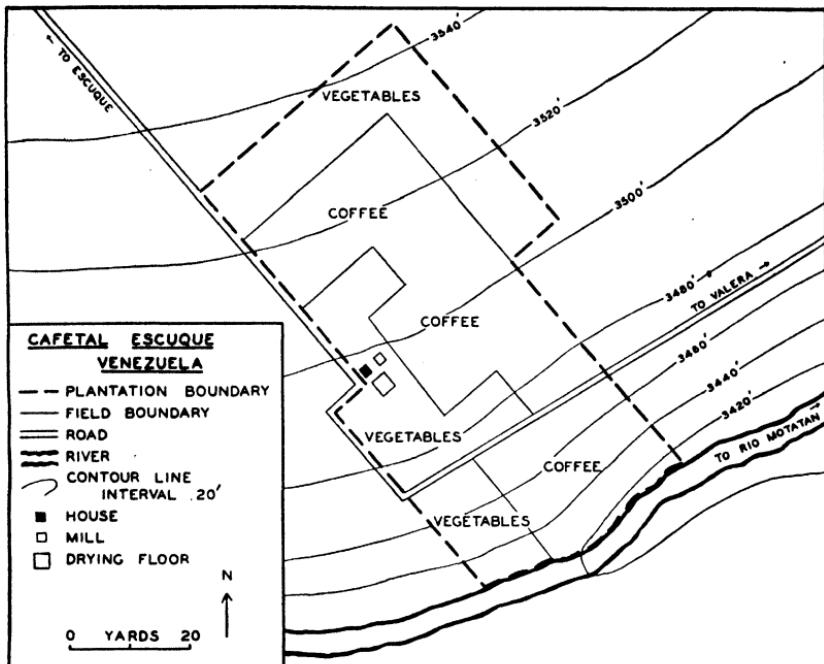


FIG. 195.—Pattern of a coffee and truck farm, Hacienda del Rio.

agricultural lowlands. Perhaps both boundaries may well be recognized, at least in the Motatán Valley, even though the lower division may depend on the topographic differences between mountain and plain rather than on the climatic affects of altitude.

Therefore, having proceeded from the lowlands into the zone of tropical agriculture, let us proceed from the *caliente* division of that zone into the *tierra templada* [Fig. 191(3)]. The town of Escuque is on a mountain shoulder up a tributary of the Rio Motatán at an elevation of about 3,600 feet above sea level. The weather is never

stream. Irrigation is not essential for coffee; but good crops are uncertain without it, and water is available in a ditch carrying a flow diverted from the stream a mile above the plantation. The land is all sloping and well drained (Fig. 195). The soil is fertile brown silt loam.

Within the 72-acre hacienda, uniformity of site is not accompanied by uniformity of occupancy. Coffee occupies about thirty acres, distributed irregularly in the central part of the property (Fig. 196). The bushes are heavily shaded, by leguminous trees in older plantings and by bananas

where permanent shade has not yet grown up in newer plantings. The importance of having dense shade is not evident, but it is favored by intelligent local opinion. The coffee is of the Arabian type.

grown at somewhat higher elevations in the district.

Perhaps the fact of low grade is connected with the owner's acceptance of other opportunities for production in the hacienda. About twenty-five



FIG. 196.—Truck crops and coffee grove, Hacienda del Rio. Workers harvesting green beans for Maracaibo market.

Seasonal operations are conveniently prolonged. Cultivation consists of a semiannual cutting of weeds before flowering in April and before harvesting in August. Picking begins in August and continues to December through the latter part of the rainy season and the beginning of the dry season. Final preparation of the product for market is not completed until March. Treatment is by simple processes with primitive but adequate equipment: a cement drying floor, a washing basin, a horse-powered mill in which the husks are removed, and a shed where the beans are sorted by hand.

The product is separated into three grades and sold to an exporter in Escueque. It is generally marketable but is given a lower rating than that

acres are occupied by truck crops in several fields in available corners of the property, the largest at the upper end, another down by the river, and a third near the central headquarters. A few of the crops are for domestic supply: cassava, beans, peas, beets, and cauliflower, corn and cane. The more important ones are for shipment: tomatoes, onions, cabbages, carrots, string beans, and radishes. The opportunity is a new one that has arisen with the rise of the Maracaibo oil fields and an accompanying market for delicate fresh vegetables, which grow poorly in the lowlands. Buyers come here for the product, and shipments are made throughout the year to Valera and thence to Maracaibo, 1,000 pounds or more weekly from Hacienda del Rio.

The owner lives in Escueque but gives constant attention to the hacienda, prescribing the careful and intensive methods of modern truck farming (Fig. 196) and the less intensive but no less specialized methods of coffee pro-

fruit trees, and hedge plants of the pineapple type. Even bananas and cane extend at least in small patches to the upper limit of the frost-free zone, where there are odd lots of coffee growing without shade trees

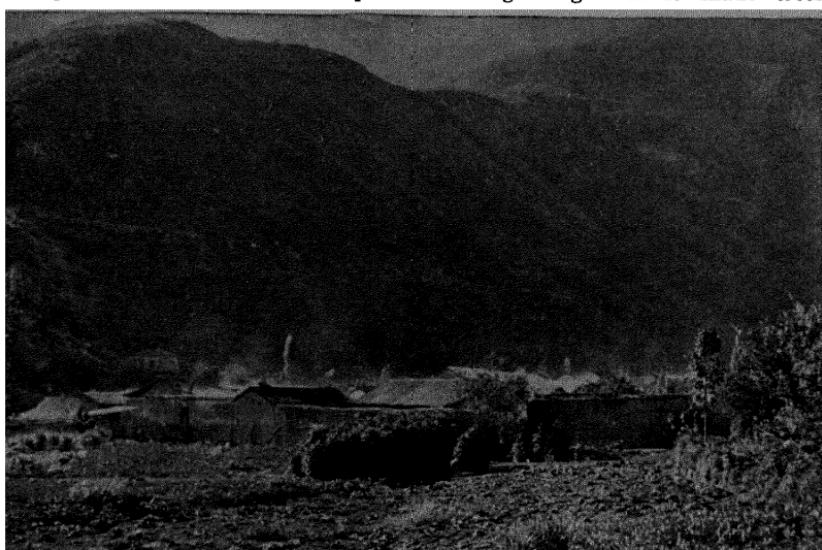


FIG. 197.—Village in Motatán Valley at the upper margin of *tierra templada* (low highlands) (Timotes, altitude 6,600 feet). The highest coffee grove in the valley, growing without shade, in the center foreground. Pastures and fields of *tierra fría* (high highlands) in the background.

duction to be followed by more than one hundred laborers.

HIGH HIGHLAND. Three thousand feet above Escueque in the mountains and also up the main valley of the Motatán, at an elevation of 6,600 feet, the zone of tropical agriculture comes to an abrupt end. Here is the boundary between the *tierra templada* and the *tierra fría*, low highlands and high highlands. In round numbers an altitude of 2,000 meters serves conveniently to mark the boundary. Probably this is the line above which killing frosts occur. Below this line the landscape is garnished with familiar representatives of tropical growth: bananas, sugar cane, cassava, coffee, evergreen

(Fig. 197). In the more varied association of wild vegetation the obvious transition is less sudden but no less distinct, from tangled evergreen woodland in the low highlands below to a smooth mantle of grass and low bushes in the high highlands above. Trees are not entirely wanting above 2,000 meters, and probably the lack of woodland is due to active clearing by a needy population as well as to slow tree growth.

From 2,000 to a little more than 3,000 meters above sea level is a zone of nontropical agriculture, extending for 14 miles along the valley [Fig. 191(4)].

The 'altitudinal range of the nontropical is somewhat less than that

of the tropical zone, and the horizontal range much less, because of steeper valley gradients and steeper slopes above, rising in shorter distances to greater heights. Subdivisions within the zone are no less conspicuous than that between the *tierra caliente* and the *tierra templada*—perhaps more conspicuous because of complete disappearance of one crop with the appearance of another owing to different frost conditions and different crop resistances. Yet this subdivision is less significant from the viewpoint of human occupancy, the various crops all having a similar function in the subsistence economy of the area.

**SUBSISTENCE FARMS.** Farming is as intensive and sedentary as in the lower zone, but uncommercialized. None of the products is suitable for export to middle latitudes, where the same commodities are more abundantly produced. Only long-established domestic commerce is involved in the movement from farms through village markets.

The population is as dense as in the tropical zone, and climatic conditions are apparently more favorable for human health and vigor. Yet the inhabitants, particularly in the upper part of the zone, are considered unintelligent by those lower down. Any or all of several possible reasons may have a bearing on this fact. The population is Indian with less admixture of white blood. The living conditions and farm practices are Indian, with only minor changes in modern times.

Subsistence farming yields a poor living, and more progressive members of the population have moved down to lower elevations where new opportunities for commercial production have developed in modern times. Inbreeding has taken place. It is anomalous but natural that the malarial, enervating city of Valera at a low elevation is a scene of bustling activity in which people higher up the valley are

considered slow and backward. Down in the *tierra caliente* the expression "You are from Chachopo" (the highest village in the *tierra fría* at 8,500 feet) is synonymous with "You are foolish."

**CORN BELT.** In the lower part of the high-highland zone, corn is the great crop of the valley bottom, in fields of various shapes and sizes, fitting into the irregularities of the ground and the intricate subdivision of property. Field sizes are small rather than large as compared with lower zones, here where the valley is narrower and its bottom steeper and less smooth and where there are no establishments for commercial production. Corn has been mentioned before as the crop of the primitive shifting milpa farms at the foot of the mountains. And it should be added that corn is present also throughout the tropical zone as a subsistence crop in small patches. Now again, in passing from the low highlands to the high highlands, corn assumes the leading role.

Field peas are the only other crop in valley fields. In household gardens a few rows of common vegetables complete the picture of the valley bottom.

On the sides of the valley another characteristic phenomenon is the growing of wheat in steep smooth fields of irregular shape formed by subterracing between rough areas of grass- or bushland (Fig. 198).

This association of corn on the bottom land and wheat on the slopes continues for 8 miles up the valley through an altitudinal range of 6,800 feet to about 8,600 feet above the sea.

**WHEAT BELT.** At the latter point, corn disappears, probably eliminated by the frost hazards of a shortened growing season. This marks the beginning of the upper part of the high-highland crop zone, the highest agricultural division, extending up the valley for a distance of 5 miles through an altitudinal range of 8,600 to 10,000 feet. Perhaps it is of some significance that above the range of corn the

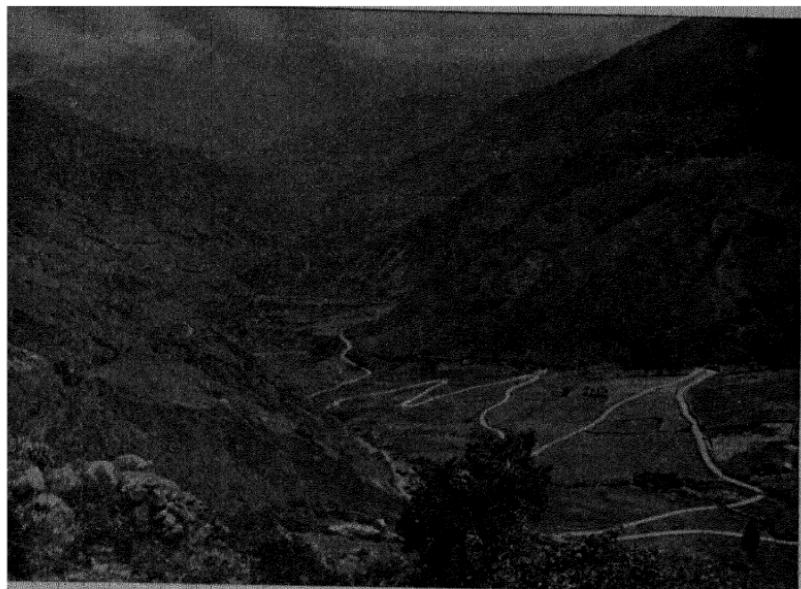


FIG. 198.—Highway winding up the steep floor of the Motatán Valley within the *tierra fría*. Corn and wheat in the valley bottom, wheat and potatoes in fields on the valley sides. View looking northeast down the valley.

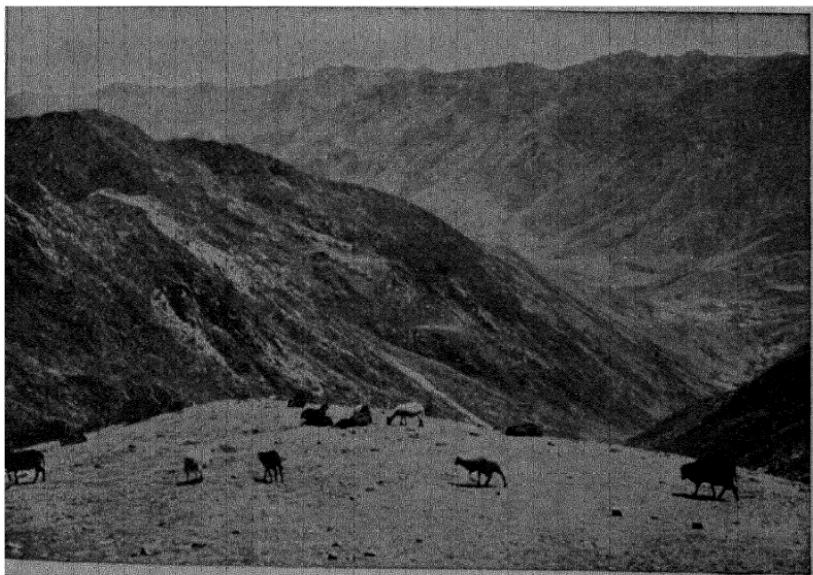


FIG. 199.—Sheep of Indian shepherds, in paramo on the divide at the head of the Motatán Valley. View looking southeast into the valley of an Orinoco headwater stream.

upper valley followed by the route of travel is not the main head of the Motatán, but a V-shaped tributary without a valley train.

The place of corn in the valley bottom is taken by wheat, in smaller and less regular fields as the valley narrows. A characteristic device of occupancy is the round threshing floor where grain is trampled out by the hoofs of animals. In the steep fields of the valley sides, wheat is replaced by potatoes, a crop that nowhere occupies a large area. The smooth patches on the valley sides shrink to small proportions and are finally lost among rough expanses of steep pasture, where the struggle for crop production is not repaid. But the potato has the distinction of holding the altitude record among the crops. Its deeply furrowed vertical rows in isolated patches near the head of the valley mark the top of the agricultural series, above 10,000 feet in elevation.

**PARAMO.** Beyond this point is the zone of high pastures, the paramo [Fig. 191(5)], extending up to the head of the valley and over the pass at 13,460 feet, and on slopes above the pass to the present snow line at 15,000 feet. The land forms are those of mountain glaciation with plucked peaks, cirques, and lakes. Here human occupancy is sparse and temporary. A few herds of cattle and flocks of sheep wander over the grassy slopes, extensive and simple livestock occupancy being thus established at the top as well as at the bottom of the mountain series (Fig. 199).

The road winds up to the head of the valley, crosses the divide to overlook the headwaters of the Orinoco, and then starts down the Chama Valley, another tributary of Lake Maracaibo, to pass in reverse order from the paramo to the zone of nontropical agriculture, the zones of tropical agriculture, *templada* and *caliente*, and the lowlands of sparse primitive occupancy.

### 8. HACIENDA EL CARMEN<sup>1</sup>

#### SABANA DE BOGOTÁ, IN THE COLOMBIAN HIGHLAND CORE

Colombia has its heart in the highlands, like other countries in tropical America. These highlands are broken and subdivided as in other countries. But, unlike most others, Colombia has not only many minor subdivisions, but two or three major divisions—a dual or triple heart. There are three cities of more than 100,000 people in the highlands—Bogotá, Medellín, and Cali, each in an isolated district separated from the others by mountain barriers entailing days of hard travel (Fig. 200). The districts around these cities are not only very separate, but very different from each other in their salient features. The studies here presented are intended to illustrate some differences between and within the districts.

Bogotá is in a plateau basin of

lacustrine deposition, about 8,500 feet in elevation and 400 square miles in area, between flanking ranges of the Andes. Most of this expanse of nearly flat land, the Sabana de Bogotá, is devoted to rural occupancy and is divided into rural estates [Figs. 163(8), 200(1), and 201]. One of these estates is Hacienda El Carmen, 12 miles north of Bogotá.

**HIGH HACIENDA.** The hacienda is a tract of 900 acres on the western slope of the easternmost branch of the Sabana. This branch has the form of a valley  $2\frac{1}{2}$  miles wide with its floor sloping almost imperceptibly from the foot of steep bordering ridges to a small sluggish central watercourse (Figs. 202 and 203). The hacienda touches the western ridge at one end of the property and from there spreads out in the

<sup>1</sup> Field work in February, 1933.

plain to include a marshy section of the central watercourse. The slope within the estate from ridge foot to marsh is about thirty feet in a mile and a half.

Poor drainage is characteristic of the

out the year, but with more frosty nights in the season from December to February and more rain and warmth from March to November.

**FARM ECONOMY.** The conditions are suitable for mixed farming of a

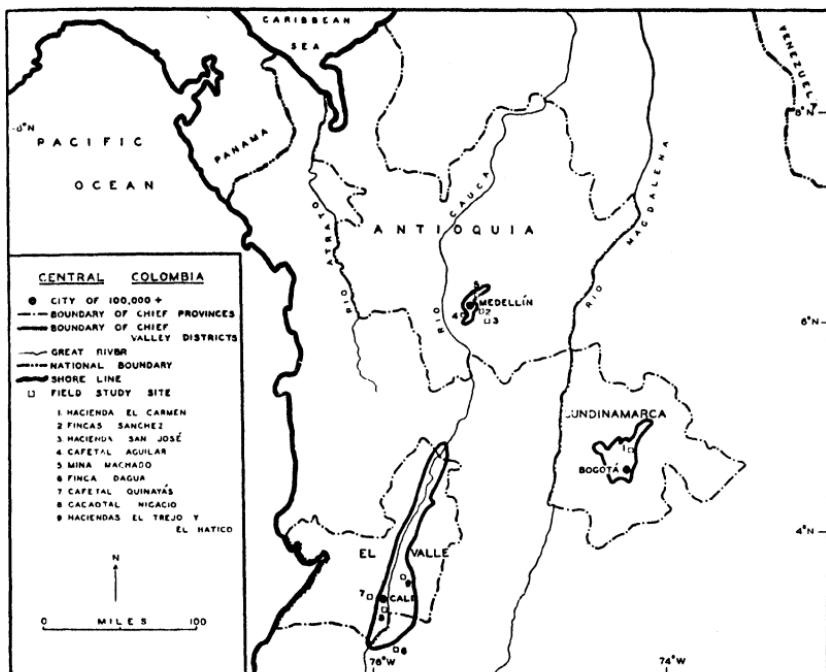


FIG. 200.—Three leading highland districts in the core region of Colombia. (*This and following regional maps of Colombia drawn by C. B. Odell.*)

area but is easily remedied by ditches between fields, forming a drainage system down to the lowest part of the property. The fields thus formed are 15 in number, averaging 60 acres each, separated by barbed-wire fences as well as by ditches (Fig. 203). Some of the fence posts are of hewn stone, and others are planted trees, appropriate substitutes for timber and metal in this isolated unforested plateau.

The soil is fertile clay loam of lacustrine origin, rich in humus. The climate is that of the high highlands, with cool weather, sunshine, and rain through-

nontropical sort. One-third of the hacienda land is occupied by harvest crops: wheat in two fields, and corn, barley, and potatoes in one field each. The processes of plowing, planting, cultivating, and harvesting are conducted with the equipment and according to the methods of fairly modern middle-latitude agriculture. Oxen are used for field work, but this is not evidence of inefficiency (Fig. 204).

Most of the remaining fields are in grass pasture, either temporarily in rotation with crops, or perma-

nently because of poor drainage at the lower end of the property. Livestock plays the leading part in the establishment. There are 60 milch cows, predominantly of Holstein-Frie-

animals, milk, wheat, corn, and vegetables. None of these products is suitable for export or even for distant domestic markets reached by mountain transportation.

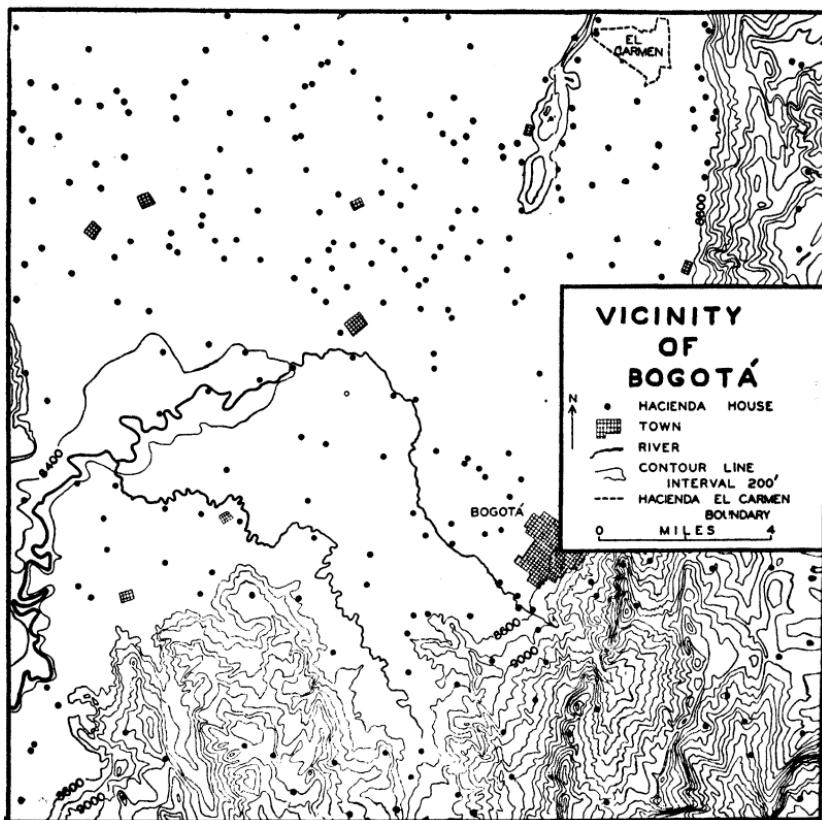


FIG. 201.—Location of El Carmen and other haciendas in the Sabana de Bogotá.

sian blood. Other cattle, including steers and calves, number 120 in the cooler season and are increased to 220 to fatten in the warmer season. In addition, there are a few horses, sheep, and pigs and a variety of poultry.

The result is unspecialized production of commodities for local supply. The inhabitants of the hacienda are fed, and in addition there is a surplus, for sale in Bogotá, of meat

Five laborers' families live on the hacienda, each family having its own house and 2-acre garden. In busy seasons, transient laborers are hired, many of them Indians from villages in the Sabana. Management of the farm is vested in a major-domo who has a larger house and a 4-acre garden.

The *casa grande* is occupied only occasionally by the owner and his family. The rambling house, sur-

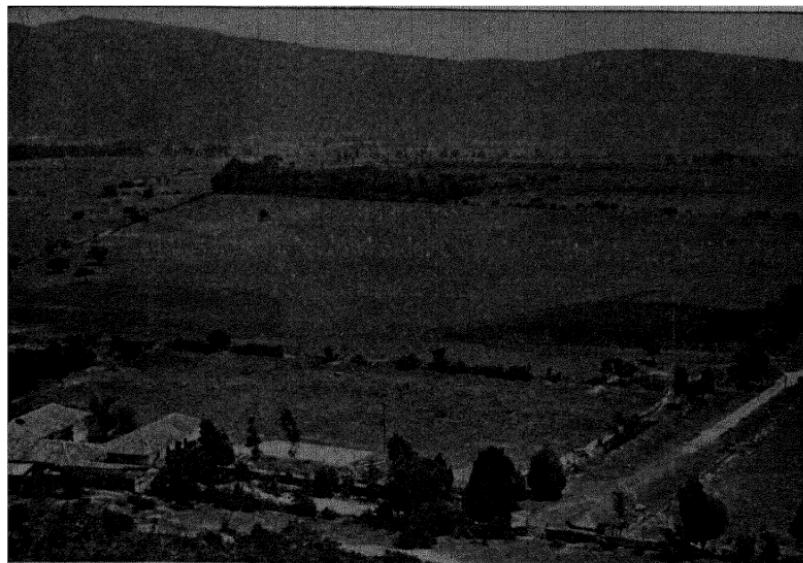


FIG. 202.—Hacienda El Carmen, view looking east from the ridge. *Casa grande* at the foot of the slope; wheat fields and pastures beyond; poorly drained bushy pastures in the middle distance; mountains bordering the Sabana in the background. The dark patch in right center is a cornfield, not indicated on the map (Fig. 203).

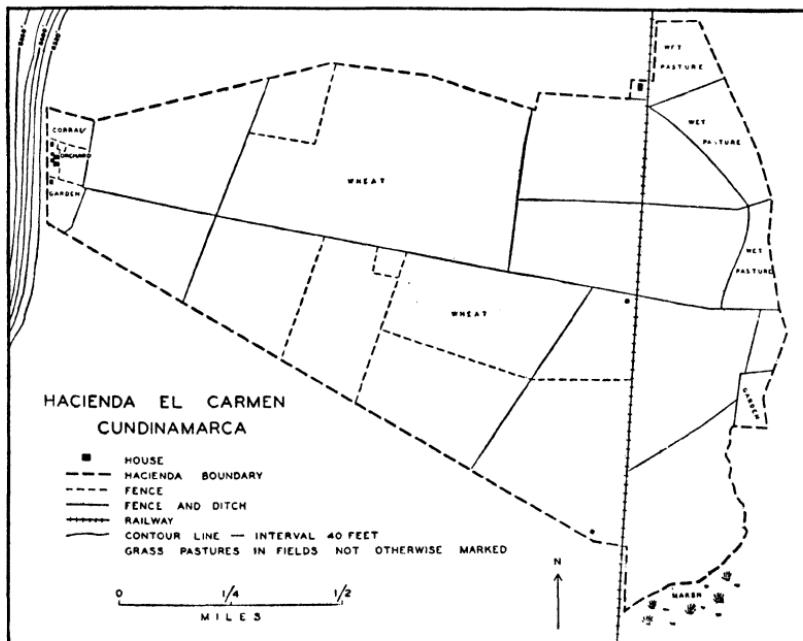


FIG. 203.—Field pattern of an hacienda in the Sabana de Bogotá.

rounded by gardens and orchards and surmounted by a chapel, overlooks the estate from a terrace at the foot

traveled, yet still satisfied with life in the Sabana de Bogotá. All this is characteristic of the Sabana.



FIG. 204.—Plowmen breaking ground for wheat, Hacienda El Carmen. The first plow imported, the second made locally. View looking east toward the range bordering the Sabana.

of the ridge (Fig. 202). It is a place of rest and recreation for gentlefolk who have their residence in Bogotá. The owner is a Colombian of patrician rank, active and influential in national affairs, educated abroad, cultured and

The importance of Bogotá is based on much more than its position of dominance in the Sabana. Its position in the nation as political, financial, and social capital counts more heavily. But the roots of all this are in the Sabana.

## 9. ANTIOQUIA<sup>1</sup>

### a. HIGH FARMS

**MEDELLÍN** is the second city of Colombia [Figs. 163(9) and 200]. It is the capital of the richest department, Antioquia, and in certain respects competes with Bogotá in importance. The city is in a basin quite unlike the Sabana de Bogotá, a mere hollow in the mountains almost filled by the urban complex (Fig. 205). Beyond this hollow in valleys and on mountain slopes are populous and productive

rural districts, which form the tributary area.

**MOUNTAIN FARM.** In the cluster of rural communities there is a considerable variety of occupancy, from which a few general types emerge. One of these types is exemplified by Finca Sanchez, 10 miles east of Medellín, beyond a mountain pass at an elevation of about 7,200 feet. This little farm is a 2-acre patch of leached residual

<sup>1</sup> Field work in January, 1933.

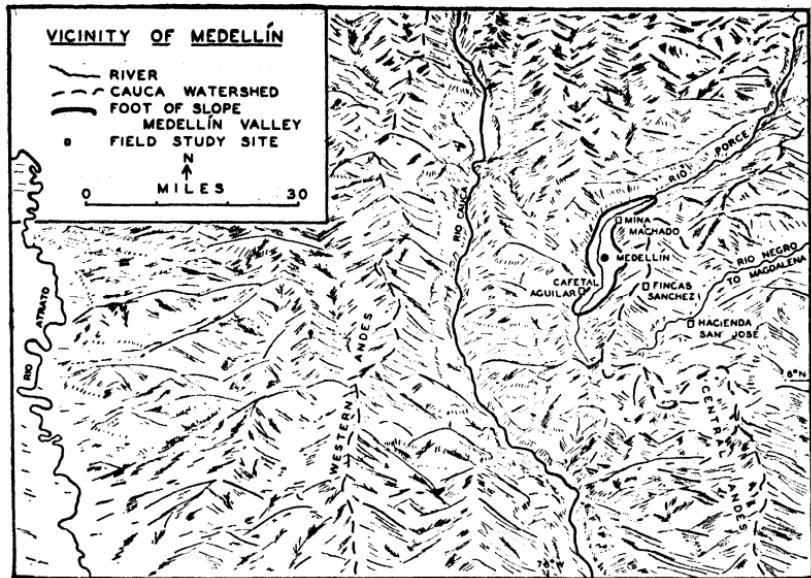


FIG. 205.—Highland area in the Department of Antioquia, Central and Western Andes.

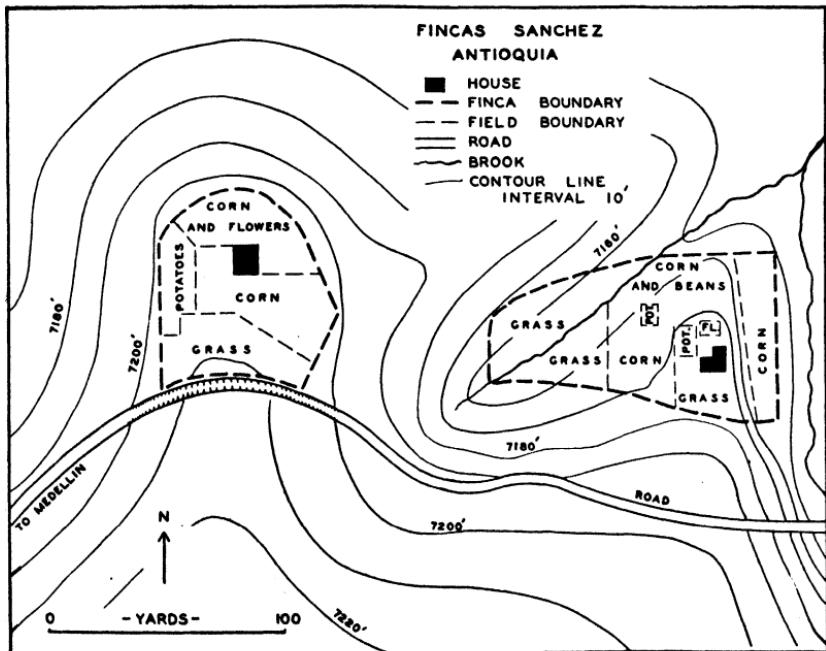


FIG. 206.—Small mountain farms, in Antioquia. The *Finca* on the western side of the map is the one described specifically in the text.

soil on a rounded spur of the mountain slope [Figs. 200(2), 205, and 206]. There are adequate moisture and moderate warmth through a frost-free season of 9 months, from March to December. The conditions allow mixed farming,

provides grassy pasture for the one cow, which at least has the distinction of belonging to the local breed of black-eared cattle, one of the few satisfactory types developed in America (Fig. 207).



FIG. 207.—Farmer, children, and black-eared cow, Finca Sanchez cornfield. The tool is a hoe; the bushy plants form a border between fields. View looking northeast toward fields of an hacienda in the background.

but of a poor sort as compared with that in the broad fertile Sabana de Bogotá. Here is the limited opportunity of poor but independent people (Fig. 207). The lack of space does not encourage rotation of crops.

The better part of the land is wanted for corn, the main food crop, year after year, one crop a year, requiring the whole growing season of 9 months from March to December, and yielding meagerly. Potatoes occupy a bit of land and yield satisfactorily if given a heavy mulch of leaf and fern mold brought from the mountain woods. They endure frost and cool weather better than corn and can be planted in December to mature in July. A few beans and squash are grown in the cornfield. The steeper and stonier slope

The farm system is a hand-to-mouth struggle to feed a family of five, and the struggle is hardly successful. The farm produces nothing to sell, and the farmer ekes out a living by working part time on road jobs. A near-by farm owned by another member of the Sanchez family is similar in size and in other respects (Fig. 206). A majority of farms in the vicinity are larger. Most of them provide full support for a family, and some haciendas provide more. But the products are similar, mainly food for local supply.

There is one exception to such subsistence production in a few farms that grow flowers for the Medellin market. For this minor specialty, farms here have an advantage over those at lower altitudes near the city. Even at

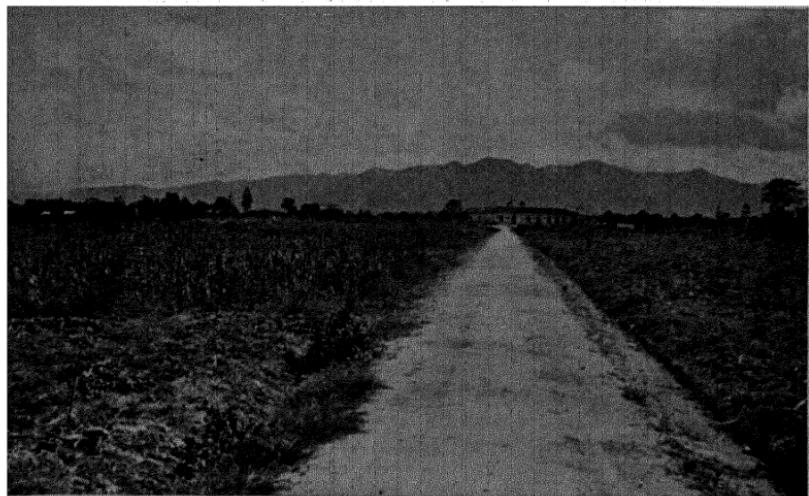


FIG. 208.—Entrance road, Hacienda San José de Bella Vista. Cornfield on left; potato field on right; *casa grande* at end of road. View looking southeast across valley.

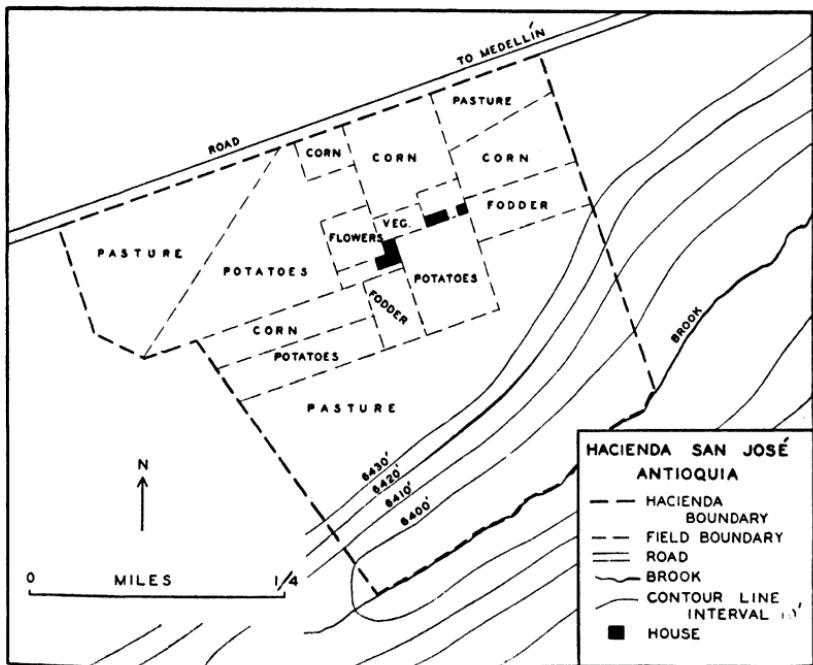


FIG. 209.—Land use in Hacienda San José de Bella Vista.

Finca Sanchez there is a patch of flowers, but this is a sign of aesthetic appreciation and not of ability to participate in commercial specialization.

The farmer and his family are of Spanish Colonial stock, intelligent and hard-working. Perhaps the pressure of such people on such land in Antioquia is responsible for the active penetration of Antioqueños into other parts of Colombia to work hard and intelligently at whatever opportunity offers.

**VALLEY FARM.** Antioquia is not all rugged and crowded with people in small poor farms. Almost within sight of Finca Sanchez, 800 feet below, is the broad fertile valley of the Rio Negro, in which are many haciendas. One of these is the Hacienda San José de Bella Vista, 62 acres of fertile black loam on a well-drained alluvial terrace [Figs. 200(3), 205, 208 and 209]. The crops are the same as in Finca Sanchez. Fifteen acres are in corn, 15 in potatoes, and 30 in pasture, including planted fodder grass (*pasto*

*imperial*), unplanted temporary pasture, and permanent pasture on the terrace slope. Equipment and farm methods are those of modern middle-latitude agriculture adapted to local conditions. The land is plowed with a tractor and fertilized with a mixture of ferns and manure before every planting. At times of high prices an intensive 2-year rotation is practiced in which a field is occupied by potatoes from July to December, by corn from February to November, and by potatoes from January to July. The process may be continued; but when yields diminish or prices decline, the land is devoted to pasture.

The establishment is a commercial rather than a household supply farm, even though the market is a local one. Substantial surpluses of corn, potatoes, calves, pigs, cheese, and honey are sold in the market town of Rio Negro. The hacienda is owned by a church order and is managed by a major-domo.

#### b. CAFETAL AGUILAR

Medellín would not be so great a city if the surrounding country produced only local food supplies. Subsistence farms do indeed prevail over a large part of the area but are less prominent than the specialized establishments of certain localized districts.

One such establishment is the Cafetal Aguilar, near Prado, 10 miles south of Medellín [Figs. 200(4) and 205], perched halfway up a smooth fanlike slope of volcanic extrusive form at an elevation of about six thousand feet. The soil is immature, friable gray silt, drainage is rapid, rainfall is moderate, temperatures are mild, never hot and never frosty.

Of the 22 acres in the property, 19 are occupied by coffee, under the shade of leguminous trees (Fig. 210). Production of the crop is a matter of careful and skillful work, with attention focused on the process of harvest-

ing, which lasts through most of the year. A warmer rainier season of only 3 months intervenes between the "little" harvest from February to May and the "big" harvest from September to January. Partial and repeated gathering to yield only ripe berries is a factor in producing a high-grade product. Treatment is a simple process, with simple small-scale equipment: pulping in a machine run by hand, fermenting in a box, and drying in trays laid in the sun (Fig. 211). The product of slightly more than one ton per year, slightly less than one-half pound per tree, is sold for export. The market town of Prado is in the midst of coffee plantations that extend for several miles up the slope, both above and below Cafetal Aguilar.

Half the acreage of the property is not occupied by coffee. Most of this

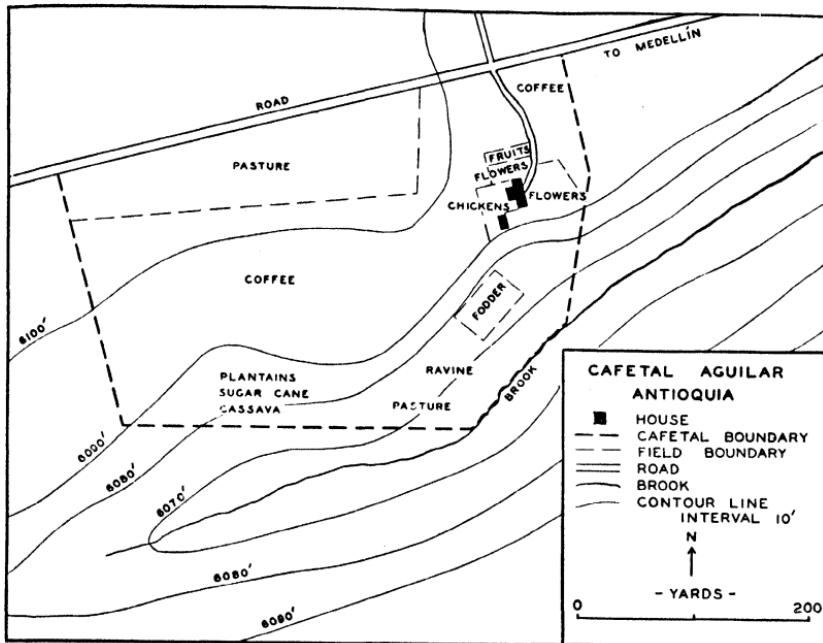


FIG. 210.—Land use in a coffee plantation.



FIG. 211. -Cafetal Aguilar. Small coffee pulping mill at left, pulp on ground below; coffee beans in drying trays; coffee bushes and shade trees in the background; carnations for the Medellin market at right.

half is in pasture on the lower slopes of the ravine, used by four cows and their calves, to furnish milk, meat, and fertilizer. One significant acre near the house is occupied by flowers grown for the Medellín market. The pattern is completed by patches of fruit and vegetables, cassava, sugar cane, and fodder grass for domestic supply. A

planting of orange trees has been started to furnish an additional market crop, and possibly these will be used as coffee shade in the future.

The owner is a resident of Medellín. The operator is a tenant, an Antioqueño of white blood, who lives on the place with his family and employs a few laborers.

#### C. A PLACER GOLD MINE

The coffee industry is a modern development and is no more responsible than subsistence farming for the his-

7 miles north of Medellín, in the Porce Valley downstream from the city [Figs. 200(5) and 205]. It is a placer

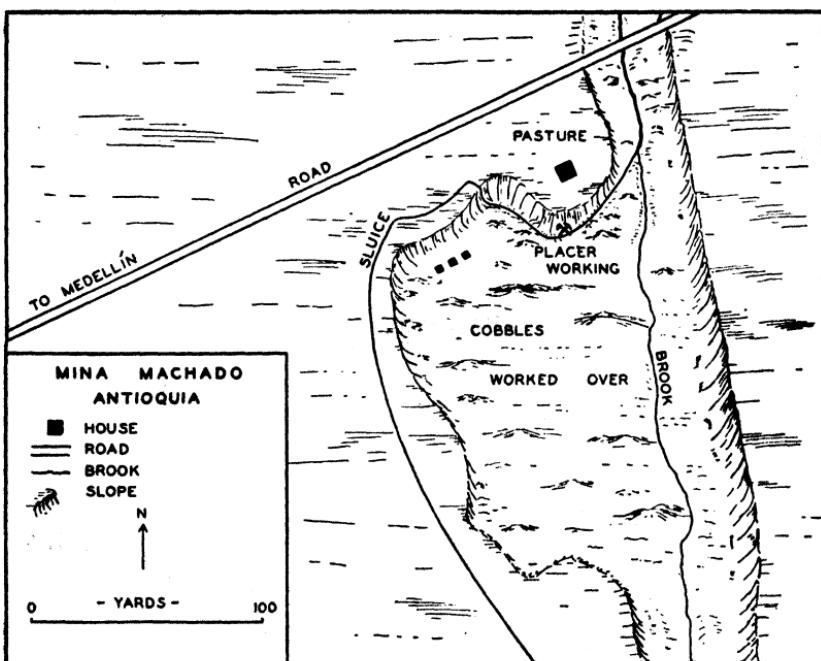


FIG. 212.—Site of old and new placer gold mining.

toric reputation of Antioquia and for its vigorous population. Another type of occupancy has been more influential in the past history of the department. This is gold mining, far less important now than in the Colonial Period but still represented by a few active establishments.

One of these is Mina Machado,

mine working in the alluvial fill along a steeply graded tributary stream just above its junction with the main river. The deposit is of poorly sorted gravel. A large area is strewn with piles of cobblestones, testifying to a long history of mining operations (Figs. 212 and 213). After years of abandonment, operations of the same primitive sort

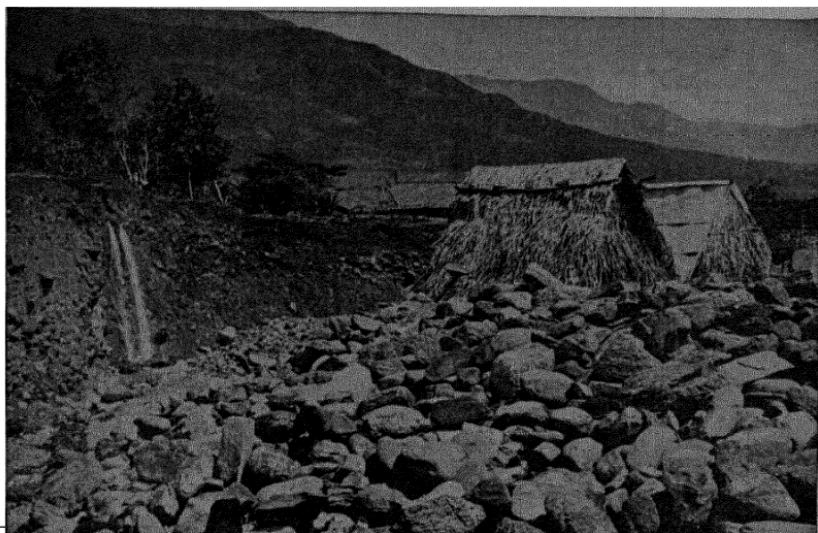


FIG. 213.—Huts at Mina Machado. Area formerly worked over at right, unworked gravel bank at left. Water for washing gravel, falling from sluice. View looking northeast across Porce Valley.



FIG. 214.—Miners washing placer gold at base of gravel bank, Mina Machado.

were begun again and have continued in the present century.

Facing the worked-over area of cobblestones is a bluff 20 feet high which marks the edge of the gravel beds hitherto undisturbed. The mining process consists of breaking down this bluff and working into it. The face is loosened by blasting, and the larger stones are picked out and thrown aside. Then the finer material, particularly that from the base of the bluff, is washed for its gold content. A sluice conducts water diverted from the stream along the base of the bluff. Each miner is equipped with a spade and a wooden bowl for washing (Fig. 214).

The working force consists of four miners and a foreman. The proceeds are not very great but are fairly

regular and are sufficient to pay expenses and give a profit to the owner of the property, an Antioqueño who lives in Medellín.

There are a few larger mines in Antioquia operating with modern machinery. But small primitive mines are more numerous and widespread. Gold mining as exemplified by Mina Machado has been a fundamental interest in the development of the region.

Medellín has other interests besides gold, coffee, food, and flowers. Prominent among other interests is manufacturing for the Colombian market. But even this and other activities are founded on the rural establishments and the rural population of Antioquia, of which examples have been described.

## 10. CAUCA VALLEY<sup>1</sup>

### a. INDIAN FARM

CALI is the third city of the Colombian highlands (Fig. 200). It is an upstart among Andean communities and until recently could not have been mentioned in the same class as Bogotá and Medellín. Now it seems to have greater prospects for further development than either of the older cities. Some clues to these recent and prospective changes are found in items of occupancy in rural areas around the city.

Cali is in a basin of lacustrine deposition, about one thousand square miles in area, between flanking ranges of the Andes (Fig. 215). The Cauca River flows through the basin and has given its name to it. The designation "Cauca Valley" is commonly applied to this basin and not to other sections of the river's course. It is unusual to compare this expanse of nearly flat fertile land with the Sabana de Bogotá even though there are many points of similarity. The basic difference is in elevation, 8,000 feet above sea level

instead of 8,500. The term "plateau" is applied regularly to the Sabana de Bogotá and not to the Cauca Valley, even though an elevation of 3,000 feet might seem to justify such a designation.

FINCA DAGUA. The first unit of occupancy to be considered in this vicinity is beyond the "Valley" in the Central Andes, 40 miles southeast of Cali [Figs. 200(6) and 215]. Finca Dagua is on a mountain spur at an elevation of 4,500 feet above the sea, 1,500 feet above the floor of the Valley (Fig. 216). The temperature is mild, the rainfall is moderate, the soil is red residual clay, leached and infertile.

A plot of half an acre is fenced in or hedged in around a one-room thatched house (Fig. 217). Outside the enclosed area is rough pasture land. Inside the enclosure are a clump of plantain, orange, and other tropical fruit trees and a patch of squash, beans, and corn. The hedge plant is a fibrous agave, providing material for woven

<sup>1</sup> Field work in February, 1933.

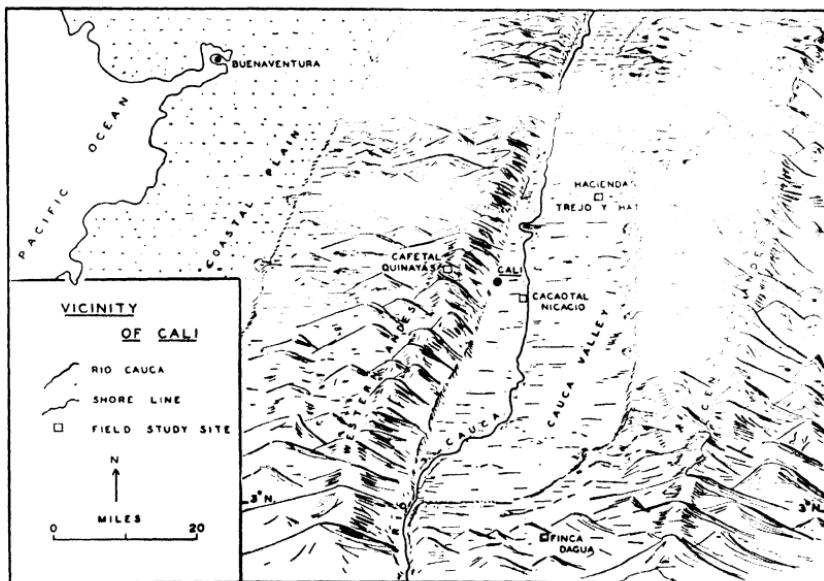


FIG. 215.—Main section of the Cauca Valley, and the chief Pacific port.

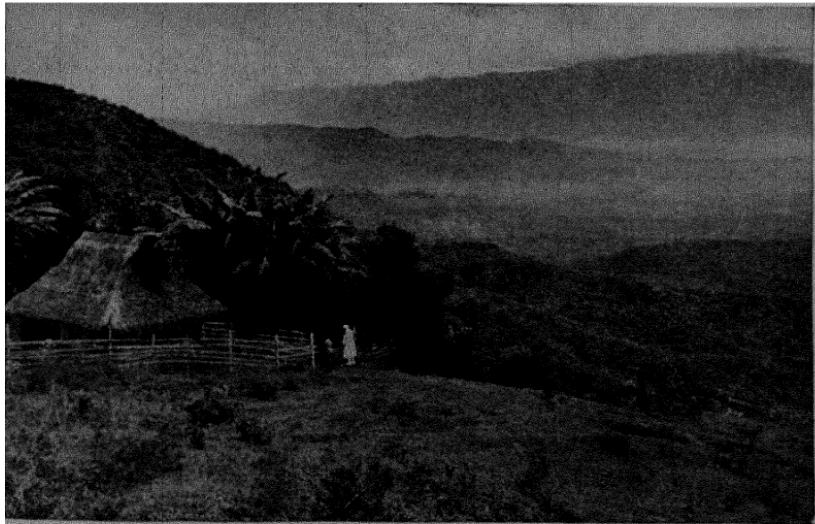


FIG. 216.—House of Indian family, Finca Dagua. View looking west across the upper end of the Cauca Valley.

articles. In and near the house is a miscellaneous assortment of poultry, pigs, and other small livestock.

The farm is that of an Indian and is

language is an Indian dialect. They do not hold title to the property; and probably if the land were productive, they would not remain undisturbed.

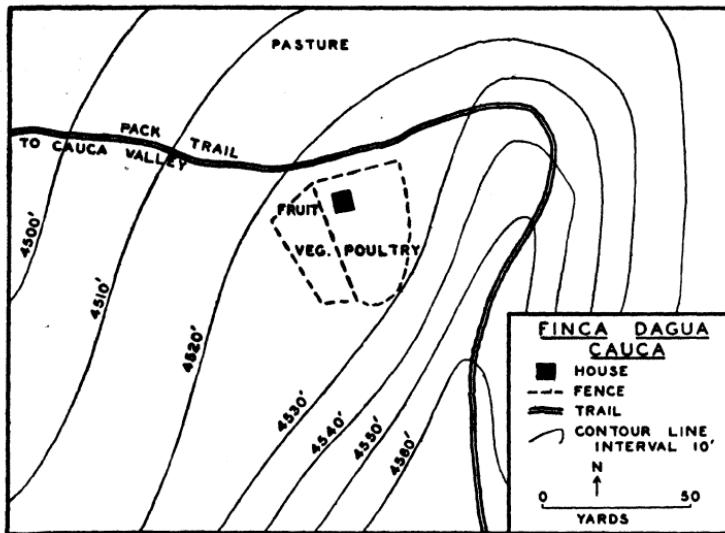


FIG. 217.—Site of Indian farmstead.

a subsistence establishment of non-European type. The farmer and his family are aboriginal inhabitants of the district, at the lower margin of a high-highland community. Their only

Their influence on the city of Cali is negligible. But they represent an old feature of the region, and they offer at least a slight clue to the past insignificance of Cali.

#### b. CAFETAL QUINAYÁS

Another item of occupancy near Cali is in the Western Andes, at an elevation of 6,500 feet above the sea [Figs. 200(7) and 215]. Cafetal Quinayás is an establishment of about ten acres having only temporary status as a separate farm unit. It is one of eight such units that a large landholder has established on cultivable sites in his property as a first step in forming a large coffee plantation. Each tenant agrees to start coffee bushes on his 10 acres of land and in return is allowed to grow other crops of his own with the coffee and is paid for

every coffee tree that lives through 3 years.

The land is on the slopes of a spur between headwater ravines of a stream tributary to the Cauca (Figs. 218 and 219). Most of it is fairly steep. The soil is moderately fertile gray clay silt. The climate is cool and moist.

Incidental crops planted with the young coffee bushes are corn on most of the land and cassava, beans, and squash in a few spots. These provide food for the family, and a surplus of corn for sale. Only a few shade trees have been started, presumably because

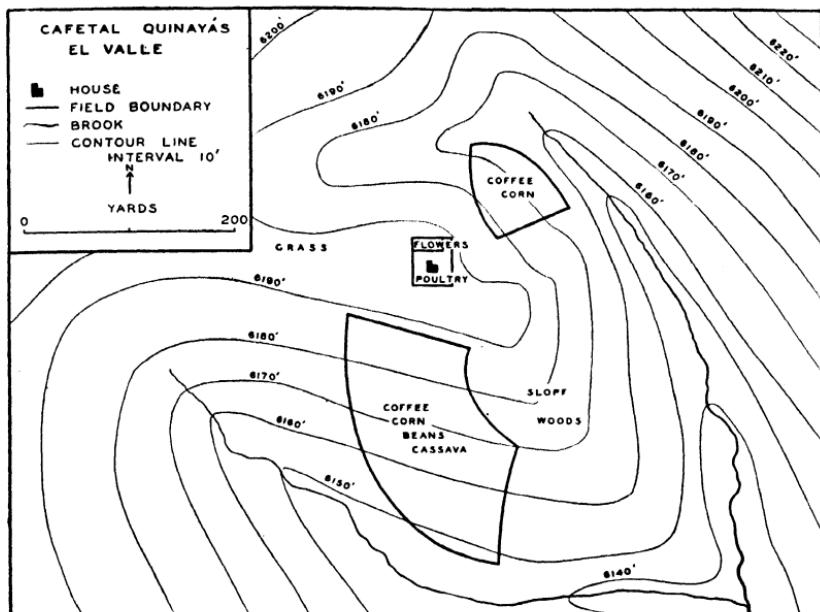


FIG. 218.—Land allotment of one tenant in new coffee hacienda. Contours on this and other sketch maps of small farms are smoothly drawn without indicating irregularity in detail.

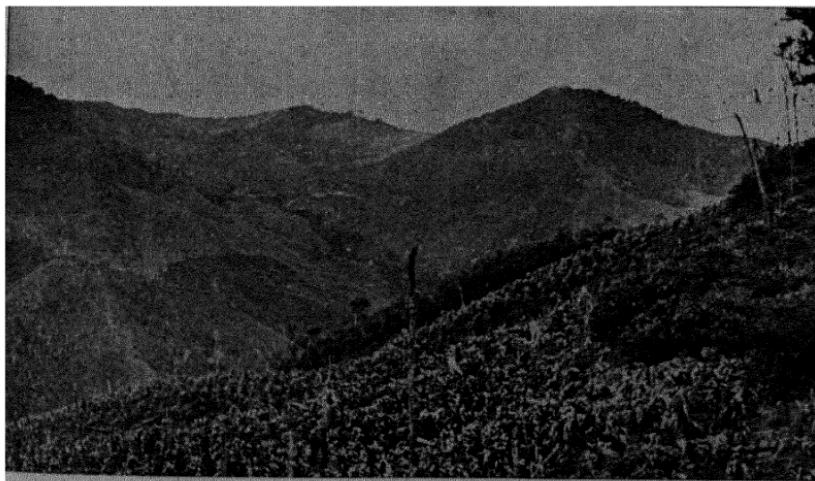


FIG. 219.—Cornfield planted by tenant, furnishing supply crop and covering young coffee plants, Cafetal Quinayás. View looking southeast across a deeply incised valley on the east slope of the Western Andes.

they are not included in the agreement, are not paid for, and do not help the tenant's crops. Possibly, also, they are not necessary in this relatively cloudy place near the summit of the range almost at the upper limit of possible coffee production.

The house is a two-room hut of thatch and wattle. The household includes the tenant and his wife and child, two laborers as roomers, a flock of chickens, and a dog. The family is of Indians who have come recently from an area of subsistence farming in the Central Andes and have not had previous experience with coffee.

Apparently the enterprise is successful for the tenant, who is not only making a living but also making a surplus. Whether or not the plantation will be successful for the landowner is still in doubt, in this untried area near the climatic limit of coffee, in soil that is not of an orthodox volcanic type, and with unskilled labor.

This may have a bearing on the future prospects of Cali. It has no bearing on the past; but whether or not this new district is successful, there are other coffee districts, already successful and tributary to Cali, that have contributed to the recent growth of the city.

#### C. CACAOTAL NICACIO

The third item of occupancy near Cali is in the Valley on the flood plain

of land bounded on one side by a bayou and on the other by a road (Fig. 220).

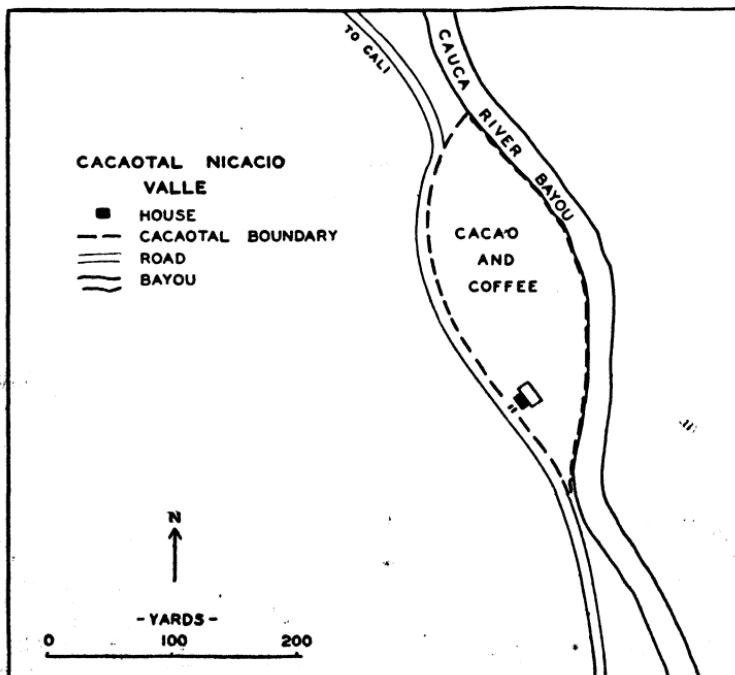


FIG. 220.—Small cacao plantation in the Cauca Valley.

of the Cauca [Figs. 200(8). and 215]  
The Cacaotal Nicacio is a 5 acre strip

The tract is covered by a dense stand  
of trees, almost like a forest and prob-

ably including some forest trees. Ceibas, palms, and plantains are conspicuous above, and cacao and coffee bushes occupy the ground below, well-shaded.

The plantation, if it can be called

The dwelling is of thatch and wattle. A dugout canoe is kept by the door, for the place is flooded occasionally, as is to be expected in the flood plain. Standing water and mud are ever present. Swarms of mosquitoes infest

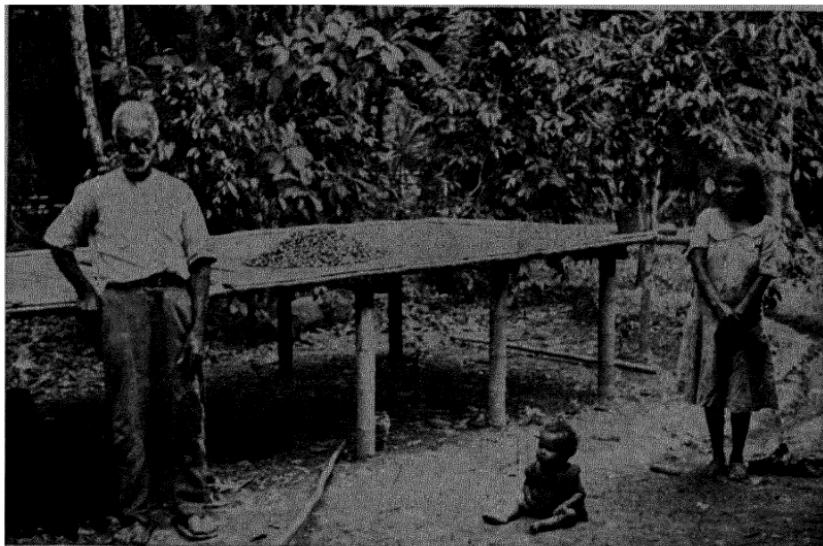


FIG. 221.—Cacao planter and family, Cacaotal Nicacio. Cacao beans on drying table. Coffee, cacao, and shade trees in the background.

such, is largely volunteer. Yet it is a productive growth. Small nuts are gathered from some of the palms; plantains are abundant; coffee is plentiful and satisfactory as a supply crop although not of marketable grade; and above all cacao is produced in large quantity and of high quality, as a marketable crop, from 280 trees.

The air of neglect is apparent rather than real. The place is kept cleared of weeds, and commercial fertilizer is used for the cacao trees twice a year. The rental value of the property is fairly high.

Every 2 weeks during the protracted harvest season, cacao pods are gathered, piled near the lagoon, and split open, and the beans are cured on a drying table near the house (Fig. 221).

every corner day and night year in and year out. Malaria is prevalent in the district.

The farmer is a Negro who has recently come from the coast. His wife is an Indian from the Central Andes (Fig. 221). They seem able and willing to endure the living conditions of a tropical flood plain in consideration of the opportunity to make a living. They represent a modern phenomenon: the world market for cacao has expanded in recent years; the production of cacao requires perpetual warmth, moisture, and shade, regularly associated with mud, mosquitoes, and malaria; when once organized commercially on a large scale, the industry can be conducted on a small scale by

farmers with little equipment and limited experience. The opportunity in the Cauca flood plain is a new one, and it has been accepted by people qualified to accept it. The settlers are predominantly Negroes. The Indian wife is exceptional rather than typical.

Without specialized commercial production the Indians were not attracted down from the mountains, and the rank, infested flood plain was left unoccupied until the recent rise of a new order. This has at least a slight bearing on the recent rise of Cali.

#### d. HACIENDAS EL TREJO AND EL HATICO

The last item of occupancy near Cali is in the Valley, 5 miles from the river, near the foot of the Central Andes [Figs. 200(9) and 215]. Haciendas El Trejo and El Hatico are the ad-

most of their courses but spreading sluggishly in small marshes in a few spots.

The soil is fertile clay loam of alluvial origin, rich in humus. The

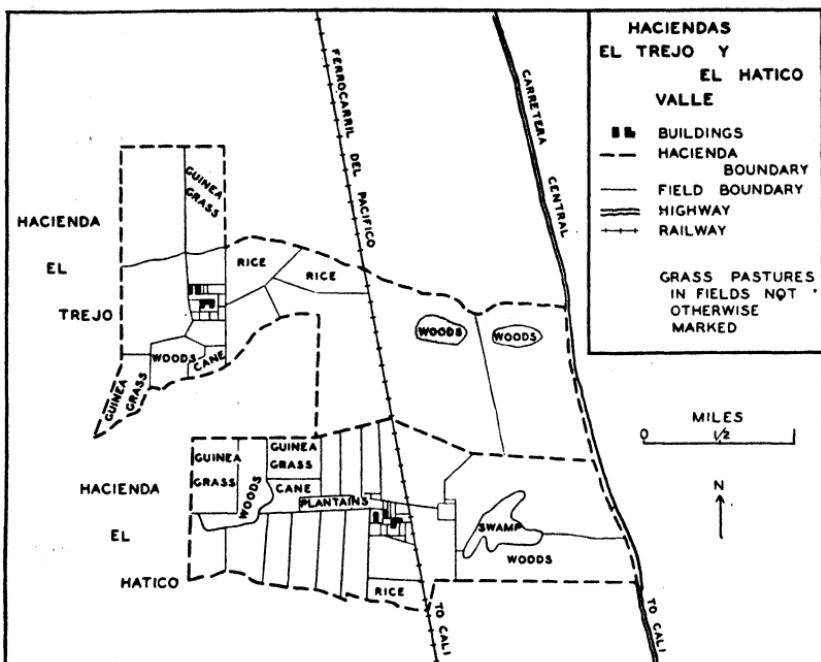


FIG. 222.—Field pattern of two haciendas in the Cauca Valley. Several fields formerly in grass are now occupied by corn, not shown on the map.

jaçent properties of two brothers, operated as a unit. Together they have an area of 3,694 acres (Figs. 222 and 223).

The land is nearly flat, with an almost imperceptible slope toward the river. It is crossed by several mountain brooks flowing fairly rapidly along

climate is that of the low highlands, with warm weather, sunshine, and rain throughout the year. The conditions allow diversified tropical farming.

Fields are irregular in form and size and about thirty in number—some occupied by remnants of the original

forest, a dense mixed tropical growth, others by open grasslands called "llanos" (apparently natural but probably cleared for pasture years ago), and others by field crops. Subdivision is by fences of barbed wire on fence posts

ment to provide material for the making of brooms for the Colombian market.

Sugar cane occupies two fields. Elsewhere in the valley are several haciendas devoted to the production of

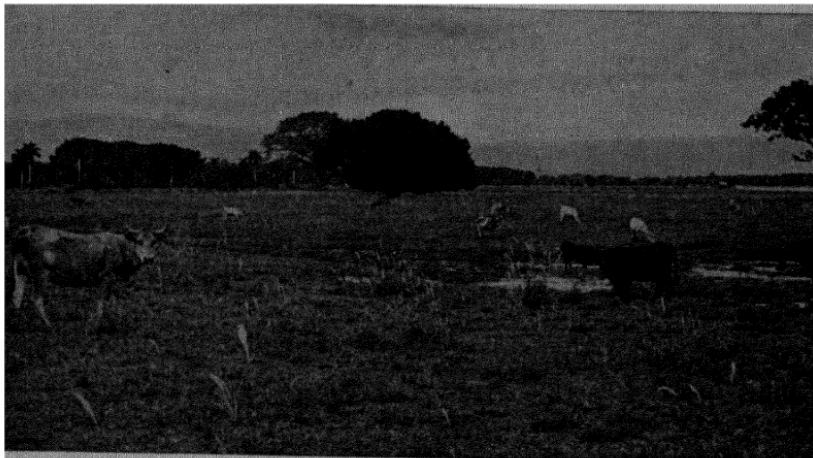


FIG. 223.—Cattle in permanent pasture land, Hacienda El Trejo. View looking west across the Cauca Valley to the Western Andes dimly visible.

that have taken root and put out leaves in the tropical farm manner.

**CROPS.** Rice of the lowland variety requiring irrigation occupies three large fields. There is stream water in abundance, and the fields selected for the purpose are adapted to seasonal flooding and draining. Methods of production are Occidental, with American machinery and in conscious relation to American methods, modified to fit local conditions of tropical land and labor. An odd touch is provided by a human scarecrow, standing on a platform in the midst of the field, recurrently whooping and cracking a long whip, evidence of rapacious birds and cheap labor. The product is sold in the Colombian market.

Several fields are occupied by corn. A small part of this is grain for domestic food supply. The larger part is broomcorn, a specialty crop chosen for adoption in this particular establish-

sugar, for which conditions of land and climate are excellent, not excelled elsewhere in Colombia.

One of the sugar haciendas, adjacent to El Hatico, is a plantation of several thousand acres, equipped with a modern central, serving the Colombian market. The others are plantations of less than one hundred acres with mills of the one-horse type making panela (cakes of brown sugar) for local markets. The sugar cane of El Trejo and El Hatico is grown for a different purpose, namely, as fodder for livestock. For this district, no more satisfactory cut-fodder crop has been found.

**LIVESTOCK.** The establishment is primarily a livestock enterprise. Pasture occupies a majority of the fields, most of them of volunteer growth, a few improved by the planting of guinea grass.

The pastures are occupied by cattle of unusually good grade for a tropical establishment. Zebu blood has not been introduced, as has been done elsewhere with no sure improvement in quality. Shorthorn blood has been

The central buildings of each hacienda are surrounded by corrals and stables, orchards of native and imported fruit, and extensive gardens. Commercial specialization has not curtailed the use of subsistence re-



FIG. 224. Owner of El Frejo with thoroughbred German stallion. *Casa grande* in the background.

added in the breeding of beef animals, and Holstein-Friesian blood for milch cows. Imported pedigree bulls have been acquired. Each of the haciendas has a dipping tank and veterinary supervision. Some of these practices are not common in the district and represent pioneer experimentation. They have now been in operation long enough to indicate success. The enterprise is a going concern, marketing regularly steers, calves, and butter. Skimmed milk is fed to pigs, which also are marketed. A flock of sheep of unimproved Andean stock provides wool for sale. The accessories of domestic supply, both plain and fancy, include pedigree horses and dogs (Fig. 224), goats, chickens, ducks, geese, and peacocks.

sources. These include not only the results of experimental culture, but also such items as volunteer coffee growing wild in the forest, not of marketable grade but gathered and used in the household, and bamboo from the forest for articles of utility.

**PEOPLE.** Clustered in the central group are the houses of the laborers, most of whom are of Negro or mestizo blood. The central feature of each hacienda is a fine old *casa grande* of historic interest (Fig. 224). The occupants are the owners and their families, Colombian aristocrats of Spanish blood. They have provided modern living facilities for permanent residence with a high standard of living, although for a time their enthusiasm for acclimatization to the

tropical environment led them to expose themselves without the protection of screens and other safeguards.

It is exceptional for the owners of large estates in the Valley to remain on their property and assume active management. Most of them live in Cali or Bogotá, leaving active supervision to a major-domo and visiting the country for only a few days or weeks in the year. The brothers who own El Trejo and El Hatico are socially prominent in Bogotá, experienced in national affairs, and educated abroad, but have returned to live on their ancestral estates as a matter of principle to combat the evils of absentee landlordism and to further the development of national resources.

**HIGHLAND CONTRASTS.** This series of Colombian field studies, which began with Hacienda El Carmen in the Sabana de Bogotá, ends with El Trejo and El Hatico in the Cauca Valley. The natural similarities between the Sabana and the Valley are seen to extend to these items of occupancy—in both cases, there are large estates organized for subsistence and moderate commerce (by means of livestock grazing, chiefly of cattle, and field cultivation, chiefly of grain crops), owned by white Colombians, and worked by dark Colombians.

At the same time, contrasts are evident, between 3,000 feet of elevation and 8,500 feet, indicating an intervening boundary between tropical living conditions and productivity below and nontropical conditions and productivity above. It is natural that the Sabana de Bogotá should be considered a plateau: few people live in the paramo above it, and many look up to it from the coffee slopes below. It is equally natural that the Cauca Valley should not be considered a plateau: people look down upon it from the coffee slopes and Indian subsistence farms above.

The potential resources of the Cauca Valley are greater, but their availability and the facilities for winning them have been less. Recently these resources have become more valuable, and many of the difficulties in winning them have been overcome. Such facts are in accordance with the old prestige of Bogotá and the recent rise of Cali. Colombian development has proceeded downward from simple, safe settlement in the Sabana de Bogotá and other high highlands, first to less simple but richer commercial interests in Antioquia and now to more dangerous but still richer tropical development in the Cauca Valley.

## 11. LA VICTORIA<sup>1</sup>

### A PLANTATION AND TRADING POST IN THE AMAZON LOWLANDS

La Victoria is on the Amazon River in the southeastern corner of Colombia, more than a thousand miles from Bogotá by way of highland roads and lowland rivers, in territory that has belonged to Colombia for only a few years [Fig. 163(11)]. The property is owned by a Peruvian who holds the land by a title from the Peruvian government antedating the cession of

the territory by Peru to Colombia. The present frontier of Peru is just across the river to the south, and the frontier of Brazil is close by to the east (Fig. 225).

The size of the property is about ten square miles with a frontage of 3 miles on the river. The water front is an advantageous one, on a secondary channel of the Amazon, where the

<sup>1</sup> Field work in November, 1935. R. S. PLATT, Conflicting Territorial Claims in the Upper Amazon, "Geographic Aspects of International Relations, Harris Foundation Lectures 1937," pp. 252-254, University of Chicago Press, Chicago, 1938.

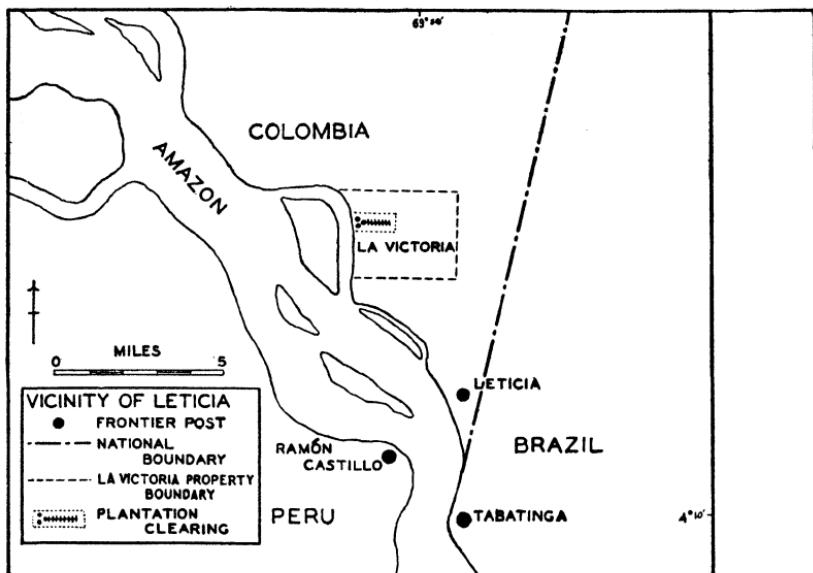


FIG. 225.—Site of La Victoria, in Colombia, near the Peruvian and Brazilian boundaries. La Victoria buildings and tramline are indicated in the plantation clearing.

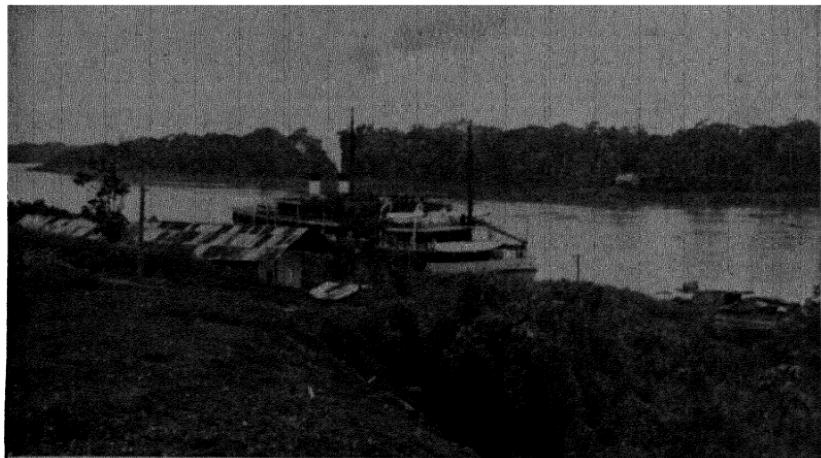


FIG. 226.—Water front at La Victoria. Amazon River steamboat stopping en route from Manaus, Brazil, to Iquitos, Peru. The bank in the foreground is the edge of upland bordering the valley. The flood-plain island in the background separates La Victoria channel from the main Amazon. An Indian house in flood-plain forest is visible on the island. View looking southwest.

bank is protected from the eroding force of the Amazon current by a flood-plain island (Fig. 226). There is no flood plain on the mainland, and the channel is bordered by a valley bluff 50 feet high, from which a

During times of low prices, it has been sold locally, upstream in Peru and downstream in Brazil.

In the process of clearing the land a few valuable timber trees have been encountered, and these have been cut

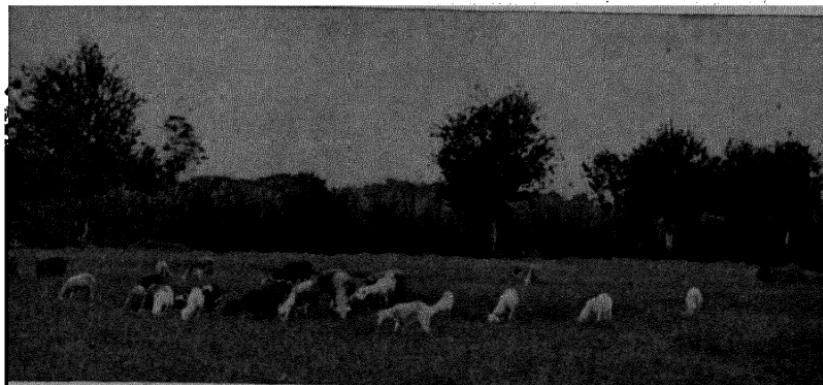


FIG. 227.—In the upland clearing, La Victoria. Sheep and cattle pasture in the foreground; sugar cane in the background. View looking north from the sugar mill.

smooth upland plain extends inland. Selva is the natural vegetation (Fig. 5, page 13), and the climate is hot and rainy in every season (Fig. 4, page 12).

The owner is a man of some capital and has undertaken more improvements than other settlers and traders along the river. On the upland plain a clearing of 400 acres has been made in the forest (Fig. 227). The soil is deep friable brown loam, well drained. Most of the clearing is occupied by sugar cane, which has produced satisfactorily for 10 years without replanting. Because there is no season of drought, the sugar content is relatively low, less than 8 per cent, but otherwise the yield is satisfactory. Harvest takes place at any time of year, after 9 months of growth.

There are a tramline system to carry the crop in from the fields and a small modern mill to produce the finished product. At a time of high prices, sugar has been exported to foreign markets by way of the Amazon.

and moved to a sawmill on the river bluff. Recently the sawmill has been a more valuable asset than the sugar mill, depending not upon timber from the property itself, but upon logs rafted down the Amazon from other areas where stands of mahogany and Spanish cedar have been sought and acquired. The lumber is shipped down the Amazon for export. The owner plans to clear more of the forest and plant mahogany and Brazil nut trees on the upland in his property.

At times, several hundred Indians have been employed in clearing land and harvesting sugar, and probably several hundred live within the property at present. At times of maximum activity, there have been also more than a hundred Peruvians from farther up the river or from the Pacific coast, who departed when employment ceased.

Other interests at La Victoria include forest specialties of the region, such as gutta percha, gathered occasionally by Indians employed for the

purpose, whenever a good demand in foreign markets makes itself felt through traders along the river. Indians are employed also to fish, particularly at the end of the rainy season, when the best fish of the region, known as *paiche* (*pirarucú* downstream

in Brazil), is caught in large quantities, preserved by drying, and marketed up and down the river. Some fresh fish and other supplies are marketed at near-by Leticia, a village of 70 houses, capital of the new Colombian territory of Amazonas.

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## Chapter VII. Ecuador, Peru, and Bolivia

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Ecuador, Peru, and Bolivia are the countries of the Central Andes facing the Pacific. Their section of the major western-highland region is distinguished as the high highlands in the low latitudes that formed the body of the Inca Empire. Each has a slice of this highland body and a share of adjacent lowlands on one or both sides (Fig. 3, page 11).

**SIMILARITIES.** In the highlands, each of the countries has extensive plateau areas, at elevations of occasional frost in the *tierra fría*, densely populated by sedentary subsistence Indians; higher areas of chronic frost unpopulated except by scattered Indian shepherds; and lower valleys in the *tierra templada* of relatively small extent (Fig. 4, page 12). Adjacent to their highlands, each has a share of the major eastern Amazon lowlands of South America (*tierra caliente*), rainy in every season, densely forested, sparsely populated by roving Indians and traders. In addition, each has some other lowland area. In each country, national affairs are the concern of a minority predominantly of Spanish descent, rather than of the Indian majority.

This recital of similarities gives no basis for separation and individual distinction among the three countries. The very fact that their territory was united in the Inca Empire and is still occupied by descendants of the same Indian inhabitants and their Spanish conquerors suggests that the present political division is not inevitable.<sup>1</sup>

Yet the division is normal; the three countries fit the general pattern for countries already given, and each is distinctive in character. The division is based, as elsewhere, on the grouping and separating of population (Fig. 8, page 16).

**SEPARATION.** Between the plateau communities of Ecuador and those of Peru is a rugged area deeply cut by headwater gorges of the Amazon. Here is the lowest pass through the Andes at any point along

<sup>1</sup> An alternative political division was in effect late in the Colonial Period and at the beginning of national independence, when Ecuador was united with Colombia and separated from Peru. The grouping of Ecuador, Peru, and Bolivia in one chapter and also the groupings in other chapters are for convenience in comparative characterization and are not to be considered otherwise as major divisions.

the highland wall in a distance of 3,000 miles, between northern Colombia and southern Chile. Yet it is practically unused, though railways climb to greater heights just to the north in Ecuador and to the south in Peru. The primary function here of land transportation is to connect plateau communities with the Pacific, not to connect the Amazon with the sea. The dissected area serves to divorce Ecuadorian and Peruvian highlands rather than to join interior and coastal lowlands.

Between Peru and Bolivia, there is no such break. In fact, the boundary at Lake Titicaca cuts through the oldest established center of population. This can be interpreted only in the light of a long sequence of events. The plateau lands bordering Lake Titicaca are near the upper limit of agriculture in the *tierra fría*. Here is a combination of circumstances apparently satisfactory for early beginnings of sedentary agriculture, including escape from tropical-lowland problems to a simpler situation where small food plants are found and easily increased and where human strength and incentive rise to tend them. But local resources are too simple and slight for much else. The center of the Inca Empire slipped away from Lake Titicaca to a lower, richer area in the Cuzco Valley. Spanish interests came to focus still farther away, for contact with the sea and for mining precious metals in districts apart from Lake Titicaca, northwest and southeast.

Thus the lake became an outlying district between separate centers each containing not only more people but also more important people than subsistence Indians around the lake. The sequence of events has a normal present outcome: the old community is cut by the international boundary, and both modern countries touch and share the lake.<sup>1</sup>

**ECUADOR.** Ecuador, Peru, and Bolivia are separate countries. In what ways are they individually distinctive? Ecuador is the only nation having its core region crossed by the equator. But, beyond giving the country its name, this mark of distinction has little significance. More vital facts are that Ecuador's core region is the most productive and attractive volcanic plateau in the Andes and that it is bordered on the seaward as well as the landward side by humid tropical lowlands (Fig. 228).

With these characteristics the plateau supports a dense Indian population of sedentary subsistence farmers and also is a chosen center of

<sup>1</sup> Other less striking cases in which boundaries bisect outlying communities are passed over without comment—for example, between Guatemala and El Salvador and between Colombia and Ecuador. In general, it may be said that in boundary delimitation the decision is by agreement between central authorities in which the outlying community has no voice and is not even treated as a unit to be preserved. In fact, the tendency to partition outlying communities between two claimants is almost as marked as that to partition outlying unoccupied regions. (R. S. Platt, *Conflicting Territorial Claims in the Upper Amazon*, "Geographic Aspects of International Relations, Harris Foundation Lectures 1937," pp. 243-245, 267-270, 274-276, University of Chicago Press, Chicago, 1938).

Spanish and subsequent control in preference to adjacent unhealthy lowlands.

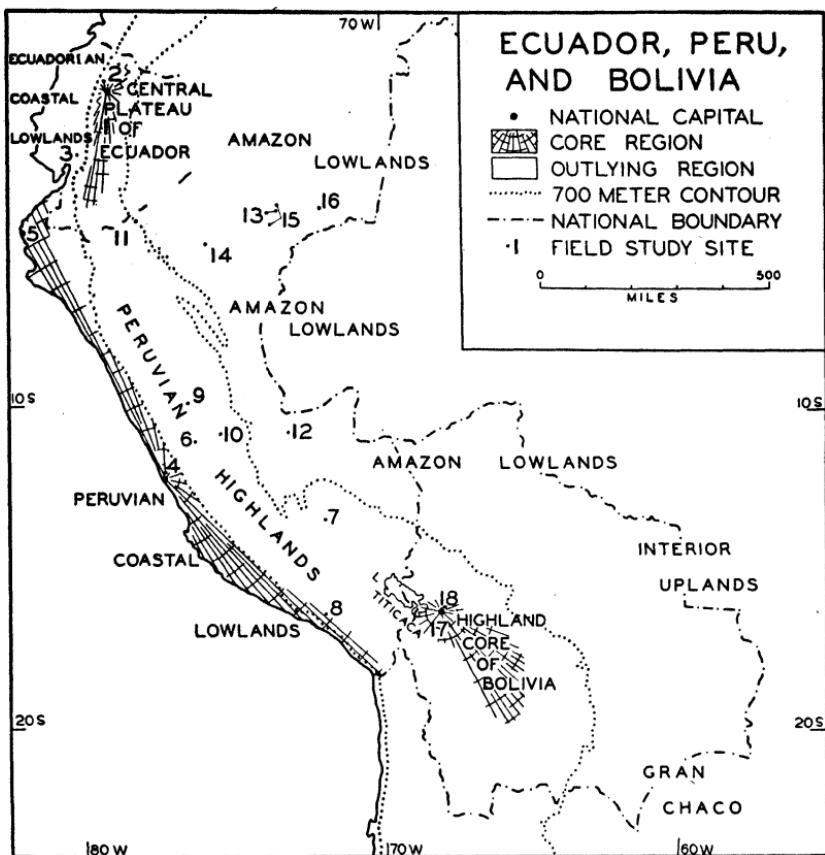


FIG. 228.—The consistent procedure of mapping one core region in each country leaves no opportunity for drawing finer distinctions. The map fails to indicate such facts as that the Peruvian highland region is like the Ecuadorian and Bolivian highlands as a populous area of Indian subsistence occupancy and that the Ecuadorian coastal region is like the Peruvian coast in having greater commercial production than the highlands—facts set forth more easily in the text than on the map.

The "core region" symbol in Peru is spread broadly over the coast, although population is concentrated in coastal valleys. The "core region" in Bolivia covers the farming and mining areas of a northern part of the highlands and leaves blank the arid highlands of the south.

Yet the plateau basins lie at an altitude of occasional frost in the *tierra fría*, too high for commercial tropical production. Moreover, Ecuador's share of the Andes lacks rich mining districts, more so than any other Andean country. Accordingly, the central region contributes

little to the commercial strength of the country. Trade in "Panama" hats, a product of painstaking Indian handicraft slightly repaid (now made in the highlands as well as in lowland districts where the fiber grows), expresses the want of a cash crop.

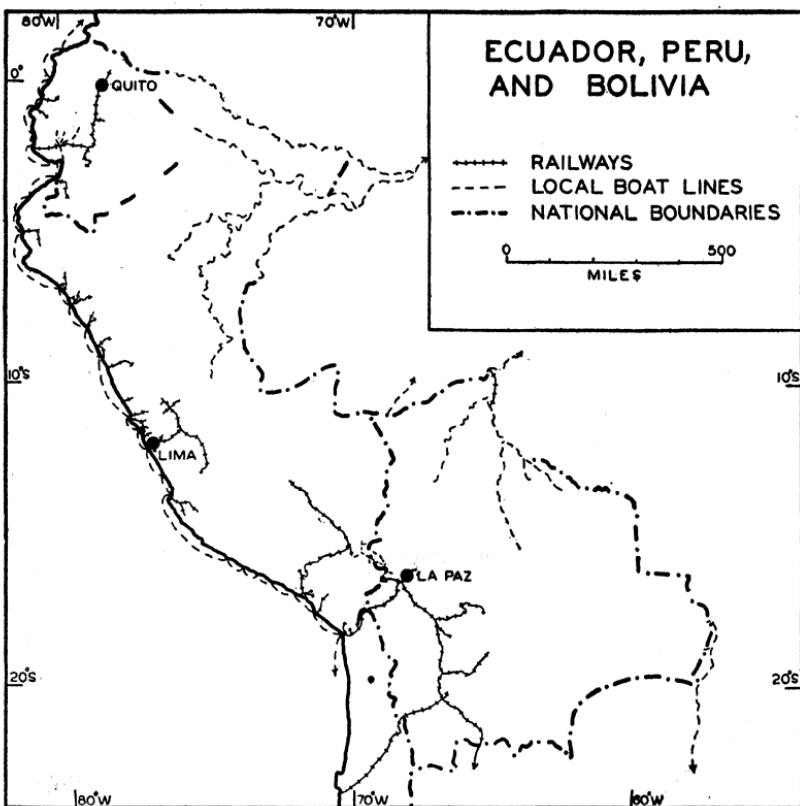


FIG. 229.—Pattern of local surface transportation. Systems arranged for penetration from the sea, and not completed for national unity except by air lines (Fig. 508).

A greater opportunity for commercial production is found in the nearby coastal lowlands, originally unattractive as compared with the plateau and still sparsely populated, but containing a modern development of specialized plantation farming—first of cacao, to lead the world for a while, and now of bananas. Relatively little attention has been given by Ecuadorians to the interior Amazon lowlands on the eastern side of the highlands, presumably in view of somewhat similar and immediately greater opportunities in the tropical rainy coastal lowlands on the western side of the country.

The transportation pattern of Ecuador has a familiar appearance, with minor variations (Fig. 229): a railway from the coast into the highlands; ramifications and supplementary roads in the populous plateau; trails reaching eastward feebly to the Amazon lowlands; and air lines to supplement both land and sea transport. The Pacific terminus of the railway, Guayaquil, is also a focus of river and coastwise routes and has become the main commercial center of the country, following plantation develop-

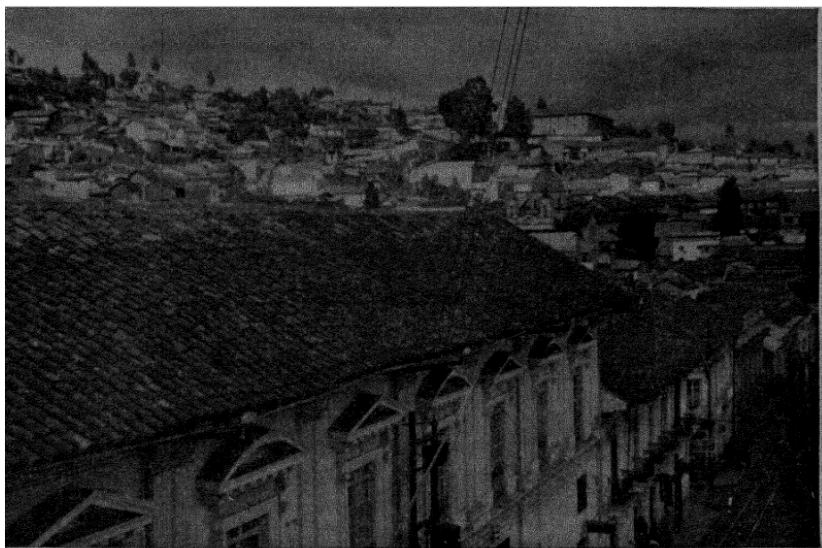


FIG. 230.—Quito, capital of Ecuador. Roofs of Colonial style, tracks and wires of the recent period. Altitude 9,500 ft. View looking northwest from the city center, January, 1936.

ment in the coastal region. Thus, with its capital (Fig. 230) in non-commercial highlands and its largest city a commercial port, Ecuador differs, at least in degree, from all other western-highland countries.

PERU is distinguished by very different and more remarkable coastal lowlands and consequently by a singular national structure. Although Peru is known as an Andean country and contains a long and populous section of the Andes and the old capital of the Inca Empire, nevertheless modern Peru is not primarily a phenomenon of the highlands: the core of the country is in the coastal lowlands, and the highlands are attached as an outlying region (Fig. 228).

Peru is the only country of the western-highland region in which a pre-Columbian capital in a highland center of Indian culture has been abandoned in favor of a coastal-lowland site for the capital of a modern country (Fig. 231). Some accounts of the Peruvian coastal region seem to suggest that this is a strange place for such an exception. The coast

has been described as uninviting, bleak, and desolate, an extreme desert in tropical latitudes (Fig. 4, page 12), bordered by rugged escarpments and washed by a cold inclement sea.

But Peru is not wrong in making the exception. Among tropical lowlands, here is one that cannot properly be called *tierra caliente* and that is attractive for settlement and readily occupied. The cold Peruvian Current is beneficent in providing a mild desert climate; streams from the high

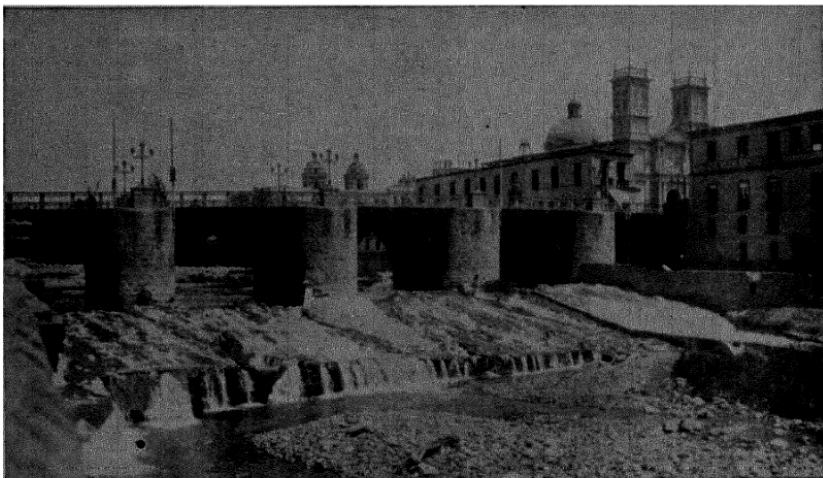


FIG. 231.—Lima, capital of Peru. The main bridge of the Colonial Period over the Rio Rimac, a primary point in the city site, where rapids mark the transition from mountain valley to coastal alluvial fan. Altitude 500 feet. View looking southeast, February, 1930.

Andes provide water and fertile soil for irrigation. Northward where the cold current leaves the shore the Peruvian desert gives way to the less salubrious rainy lowlands of Ecuador. So the contrast in capitals is not strange, particularly in view of the Peruvian highland alternative. The old capital city of Cuzco is at a greater altitude and less accessible than the capitals in most of the other highland countries.

Not only are the Peruvian coastal lowlands habitable and convenient for a capital, but they are the most important region of production. In Spanish Colonial times the highlands furnished precious metals as chief products of the area, and the coastal lowlands furnished only gateways to the highlands. But since then the lowlands have taken the lead with commodities of modern commerce, first, guano from desert islands; later, tropical plantation crops from scores of irrigated valleys; and now, in addition, petroleum. Meanwhile, the lowlands are still the gateways of the highlands. The total population of the coastal region is less than that of the highlands (Fig. 8, page 16), but the largest concen-

tration of people effectively grouped in well-connected communities is in the lowlands. The leadership of the coastal region is unrivaled.

The Peruvian highland region is populated mainly by Indian subsistence farmers, in plateau basins and valleys more scattered and less productive than those of Ecuador and most of them at higher elevations within the zone of frost. The highlands contain one of the principal Andean mining districts, Cerro de Pasco, already referred to<sup>1</sup> as a Spanish Colonial focus of interest producing precious metal (silver), and now again fairly conspicuous in the national economy as a producer of copper. Such internal differences between the Peruvian and Ecuadorian highlands are slight as compared with the external differences of the two areas in their relations to two contrasted coastal regions.

The Amazon lowlands of Peru likewise are distinguished by external relations rather than by internal qualities. Peru's share of the Amazon region is more generous in size than that of Ecuador. Peruvian expansion here accompanies Ecuadorian contraction, sharply defined in the protracted boundary controversy between the two countries. Greater vigor of Peruvian occupancy in the region is compatible with easier routes of access from Peruvian highland communities to navigable Amazon water and also with Peru's special lack of other areas of rainy lowland for settlement and exploitation beyond the confines of crowded desert oases and highland valleys.

Peruvian occupancy in the several regions of the country is reflected in the national transportation pattern (Fig. 229). In the coastal region, many short railways penetrate valley oases from near-by ports, each railway a branch of the sea highway by which all are connected. Two longer railways extend from ports into the highlands and there ramify in plateau areas.

Farther east, a navigable concourse of Amazon tributaries has formed a nearly separate part of the Peruvian transportation system, emphasizing the traffic barrier presented not by the high plateaus but by the lower rugged forested eastern slopes just above the heads of stream navigation. One regular connection between outlying eastern Peru and the heart of the country has been by a voyage of over six thousand miles down the Amazon and through the Atlantic, the Caribbean, the Panama Canal, and the Pacific to the principal Peruvian port of Callao.

For more direct connection across the narrow gap between plateau roads and navigable streams, there has been first a pack trail, then airplane service, and finally the prospect of a passable motor road uniting the national system for practical purposes. Meanwhile, air lines continue to develop, not only to cross the gap but also to supplement water and

<sup>1</sup> Page 246.

land transport along the coast, into the highlands, and along Amazon tributaries.

BOLIVIA is obviously different from Ecuador and Peru in its lack of coastal lowlands (Fig. 228). In this connection, it is to be noted that Bolivia differed from its neighbors even when it had coastal lowlands and that Ecuador and Peru differ from each other primarily in the distinctive characteristics of their coastal lowlands.

The former coastal region of Bolivia has different characteristics. It is a desert unrelieved by streams from the mountains. Its lack of oases in contrast with Peru is consistent with its location farther south of the equatorial margin of the desert and at the foot of a higher and wider highland mass.

The highlands contain districts rich in minerals, southeast of Lake Titicaca, as already mentioned,<sup>1</sup> and broad plateau areas within the zone of frost. This is the setting for a country of mines and Indian subsistence farms, with only a slight interest in distant desert coastal lowlands, until too late to hold them against an active neighbor's special interest.

Political loss of the coast has won for Bolivia the designation "inland nation." Yet the coast still exists and serves Bolivia as an outlet better than before. Bolivian national life is no more "inland" than formerly and not much more so than that of the other plateau-centric countries. Bolivian difficulties seem to reflect limitations of the other regions rather than lack of a national port.

Limitations of the plateau region are those of (1) scant subsistence farming in districts higher and drier than most highland communities of Peru; and (2) mining for silver to the point of exhaustion in Spanish Colonial times, and for industrial metals, particularly tin, in mediocre deposits inconveniently located, in recent times.

Under the circumstances, Bolivia faces eastward more attentively than Peru and has more varied opportunities than Peru in outlying regions in that direction. The eastern slopes of the highlands are broader in Bolivia than in Ecuador or Peru and contain more fertile valleys extending down through the range of climatic zones from occasional frost to constant heat. These valleys hold communities isolated from each other and appended to the plateau, but taken together they form the most populous section of Bolivia (Fig. 8, page 16).

Beyond the foot of the highlands, Bolivia has extensive areas including not only a share of the Amazon region in the northeast, but also to the southeast a bit of the Paraná lowlands in the Chaco (withheld from Paraguay in the recent boundary adjustment), and between the two a district of uplands adjoining the Brazilian interior, occupied by cattle ranches and tropical farms (Figs. 3, page 11, and 228).

<sup>1</sup> Page 246.

Even without coastal waters, Bolivia has a transportation pattern no less coherent than that of Peru (Fig. 229). Railways in the plateau connect at a common point from which lines extend by different routes to three coastal ports, two on the Chilean coast, and one, reached through a water link across Lake Titicaca, on the Peruvian coast. At the main railway junction in the plateau, there is only a small town, while at the end of a branch line, twenty miles away, is the capital and largest city of the country, La Paz, crowded down below the rim of the plateau in the

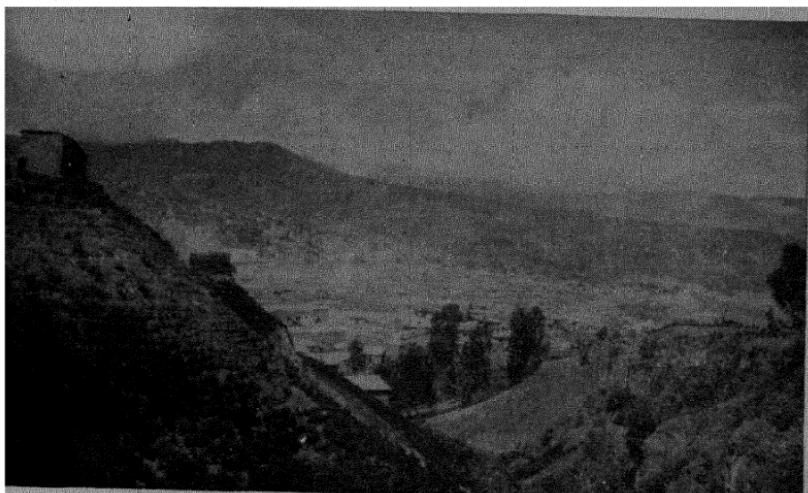


FIG. 232.—La Paz, capital of Bolivia, nestling below the level of the plateau. (The more isolated town of Sucre, though designated as capital, is not the seat of government.) Potato fields on the slope at the left. Altitude 12,000 ft. View looking east, across the gorge, toward the cloud-capped eastern range of the Andes, February, 1930.

head of a small valley tributary to the Amazon (Fig. 232), thus escaping from the high, wind-swept plateau to a slightly more genial site.

Other railway branches reach down the eastern slope of the highlands; a highway extends to the chief district in the lowlands; trails connect with navigable headwaters of the Amazon and the Paraná; and air lines provide both local service and international connections north, south, and east.

**EVENTFUL COUNTRIES.** The three nations of the Central Andes, viewed at close range, appear to be countries of colorful contrast. However, the great differences are not between the countries themselves but between the regions that they share among them. In this respect, they resemble the countries of Central America, but with greater extremes of regional contrast, from greater heights to greater lowland deserts and forests.

They are acrobats in history as well as in geography, with Peru the central figure, and Ecuador and Bolivia accompanying performers. Their life story is marked by the rise and fall of the greatest pre-Columbian empire of South America, the rise and fall of the greatest Spanish vice-royalty, and the ups and downs of national riches and disaster. They are not masters of their fate in the modern world, but they play parts that may be critical, in view of their special resources and their place in Latin America at a point where intercontinental forces meet.

Ecuador and Bolivia, if not Peru, have been troubled by problems of balanced development and self-support in a continent of nations left to manage their own political affairs. But, in a world contest of continents and special objectives, the chances of benefit from their resources and for their people are relatively good.

### Field Studies

The following field studies illustrate the striking regional contrasts within the Central Andean countries and incidentally indicate some contrasts among the three countries, as separate units, even though not covering all their regions in balanced fashion.

*In Ecuador.* The highland core of Ecuador is comparable with other centers of population and subsistence production in high highlands, discussed in previous chapters,<sup>1</sup> similar in certain general characteristics and different in specific details. The Ecuadorian highlands are represented by a small subsistence farm near the upper limit of agriculture (1) and an hacienda in the midst of the plateau (2).

The coastal lowlands are the chief Ecuadorian region of commercial production, mainly in tropical plantations, as represented by Hacienda San Miguel (3).

The eastern lowlands of Ecuador are not represented as such in the field studies, but several of the studies included as of eastern Peru are in territory that has been claimed also by Ecuador and may in any case be taken to represent eastern Ecuador.

*In Peru.* In Peru the coastal lowlands form the core region of the country. The first Peruvian studies are of that region and illustrate major types of occupancy. There is large-scale commercial farming by irrigation in valleys of the coastal desert, particularly cotton and sugar plantations [4(a) and 4(b)]. The other great productive enterprise drawing directly upon natural resources of the coast is the petroleum field (5).

The Peruvian highlands are comparable with those of Ecuador and others in low latitudes, with similar occupancy at similar altitudes. The range of well-developed highland settlement is unusually great in Peru,

<sup>1</sup> Central Plateau of Mexico, Chap. II; Central Plateau of Guatemala, Chap. III; southwestern Sierras of Venezuela, Chap. VI; Sabana de Bogotá, Chap. VI.

and the series of studies here presented is more complete than that in any of the other countries, beginning at a high altitude and ending at a low.

The first and highest is a sheep ranch above the range of agriculture (6). The second is a corn farm in the zone of subsistence agriculture (7). The third and fourth are on the dry western slope of the Andes: a food and fodder farm low in the zone of subsistence agriculture [8(a)], and a small subtropical specialty farm still lower down [8(b)]. The fifth and sixth are on the eastern slope of the Andes at low-highland elevations: an old sugar plantation (9); and a new coffee plantation, the lowest in the series (10).

Copper mining, the leading source of export trade in the Peruvian highlands, is not represented by a specific Peruvian study but has been included in observation and generalization. It is so like mining elsewhere in its general characteristics that it may be considered as sufficiently represented by mining studies in other countries.

The eastern lowlands of Peru are sparsely populated and slightly productive. But the region is of a distinctive type and contains several distinctive forms of occupancy. The series of field studies exemplifies leading kinds of occupancy, representative not only of Peru but of other parts of the forested Amazon lowlands, beginning with the most primitive occupancy.

The first is a small settlement of forest Indians only slightly influenced by the outside world (11). The second is a settlement of forest Indians in touch with the outside world and recently reorganized (12). The third and fourth are river establishments for gathering forest products to be exported and in touch with the outside world for many years: an old rubber area, largely inactive [13(a)]; and a tagua nut area, fairly active [13(b)]. The fifth is an upriver trading post dealing in forest products and supplies for forest people (14). The sixth and seventh are tropical plantations recently developed on a considerable scale: a flood-plain sugar plantation [15(a)], and an upland plantation of coffee and barbasco [15(b)]. The eighth is a new trading post and plantation, farther away from the Andes and down the Amazon, near the eastern boundary of Peru (16).

*In Bolivia.* The core of Bolivia is in the highlands, and the outstanding forms of occupancy are subsistence farming and metal mining, particularly tin. These are represented in the study of a small Indian subsistence farm in the plateau near the upper limit of agriculture (17) and a tin mine in the eastern Andes (18).

The eastern slopes and lowlands of Bolivia are unrepresented in the studies, though not forgotten in formulating generalizations. They are not wholly unlike corresponding regions in other countries—the eastern

slopes and Amazon lowlands as in Peru, the eastern uplands as in Venezuelan Guiana, and the Chaco as in Paraguay.

### 1. CHIMBORAZO<sup>1</sup>

#### A HIGH FARM IN THE CENTRAL PLATEAU, ECUADOR

A giant spur of Volcan Chimborazo extends eastward between basins of the Ecuadorian plateau. On a small finger of this spur, between ravines dissecting its northern margin, is a group of small

ribbon of land across the top of the upland finger and down into the ravine on one side (Fig. 234). The area is about five acres. The soil is a fertile loam, product of volcanic ash from

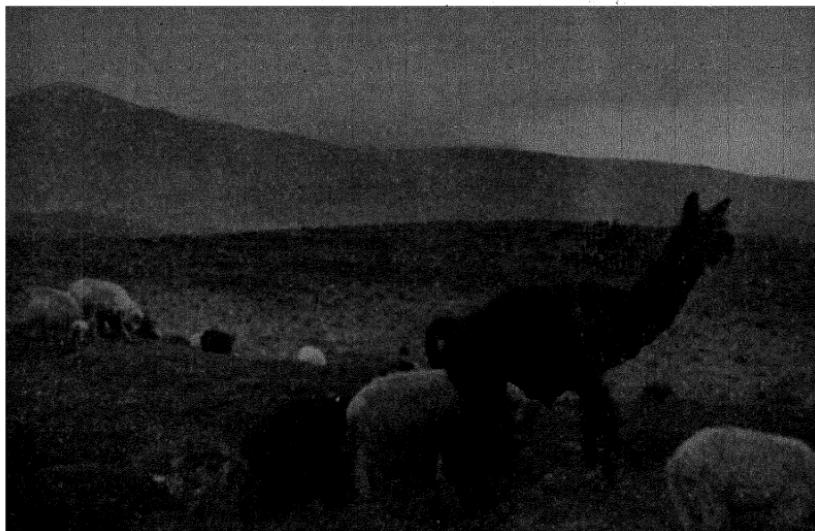


FIG. 233.—Indian flock on the paramo of Volcan Chimborazo, at 13,000 ft. White and black sheep and llama. View looking east across the intermont plateau.

farms [Fig. 228(1)]. The altitude is about 11,500 feet above the sea, near the upper limit of agriculture in this latitude,  $1\frac{1}{2}^{\circ}$  south of the equator. Lower down the slope to the north are the more extensive fields of productive haciendas in basins and valleys. Higher up the slope to the south are the bleak paramos of open-range grasslands (Fig. 233).

**FARM SITE.** One of the farms is that of Juan Leon Cuzeo. It is a

Chimborazo. The climate is cool and moist in every season. Frost is common, and warm nights are unknown. Summer heat is felt only in the direct rays of the sun on bright days. On many other days the clouds hang low and sometimes envelop the farm in a wet mist.

Only hardy crops requiring little heat and enduring cold can be produced here. Such crops grow well in the fertile soil of the gently sloping

<sup>1</sup> Field work in January, 1936.

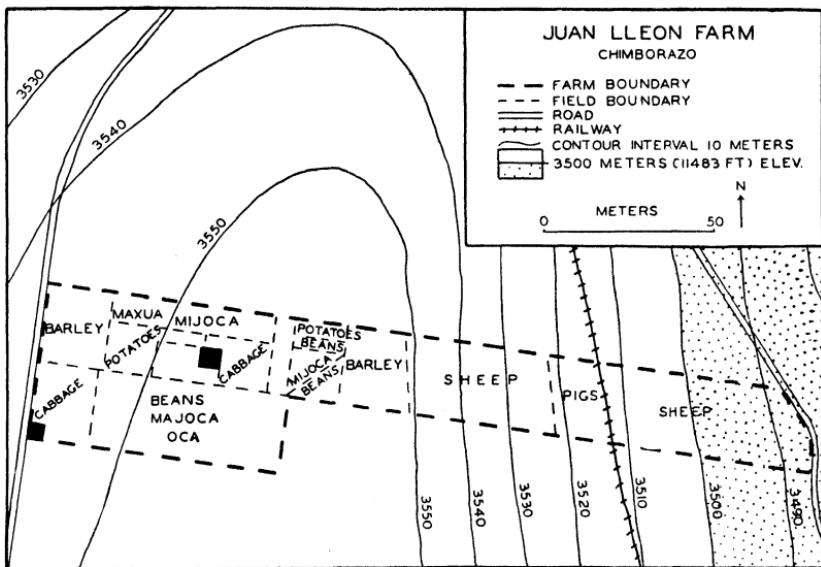


FIG. 234.—Land use in Chimborazo Farm, one of a group of small farms at 11,500 feet altitude. The boundaries are well-defined but probably less well surveyed than the straight lines and right angles of the sketch map suggest.

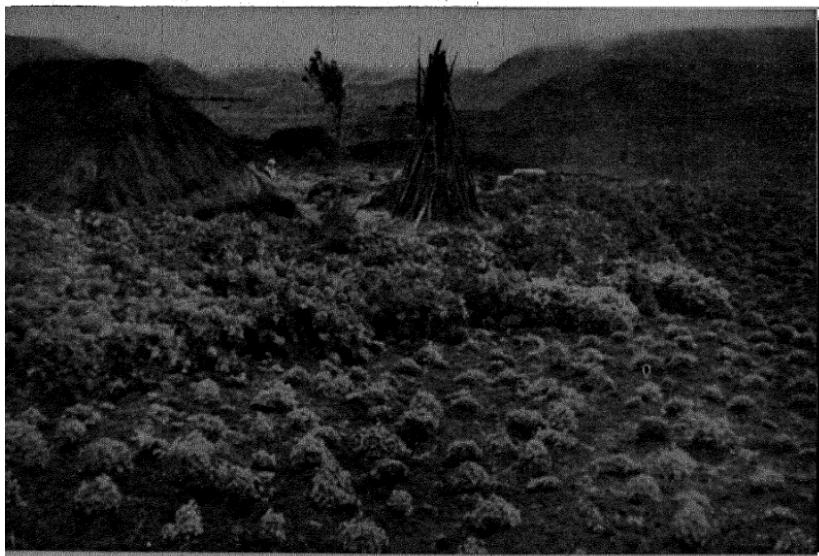


FIG. 235.—Chimborazo Farm. The house thatched with grass at the left; a neighbor's house beyond; a stack of poles brought from wooded lower slopes; fields of *mijoca* and cabbage in the foreground. View looking southwest.

ridge top. The aspect of the little fields is that of a hardy vegetable garden in middle latitudes (Fig. 235).

One of the crops is barley, a grain introduced from Europe in Colonial times. The altitude is too great for

native grass. Sheep graze here, and in one hollow there are a few pigs. This part of the farm is not separated from that of neighbors and is included in the common pasture land where the sheep of the community graze together



FIG. 236.—Chimborazo farmer, wife, and daughters, in the front portico of the house. The farmer sitting at the loom weaving woolen cloth for family clothing. The wife interrupted from wool preparation. An iron pot, one of the few market purchases of the household, at the left. View looking east.

corn, a native cereal, and probably too great for quinoa, a minor native cereal. The other crops are natives of the region, some of them now well-known over the world—potatoes, beans, and cabbage. Others still known only in this region of their origin are *oca*, *mijoca*, *majoca*, and *marua*. It is noteworthy that these four hardy root vegetables, which have not spread to other parts of the world, are here considered inferior to one local root crop, the potato, which has been found so worthy of propagation in other regions as to have become prominent in world agriculture.

The lower part of the farm, too steep for cultivation, is covered with

under the care of a single shepherd. Here at the upper limit of agriculture there is no lack of pasture land in the ravines below and on the paramo above.

**FARM ECONOMY.** The crops and animals of Juan Lleon furnish a living for his family. The farm is a subsistence establishment in which the needs are met by the products; little or nothing is bought or sold. The crops and animals furnish sufficient food. The wool of the sheep is made into clothing by Juan himself on a handmade loom (Fig. 236). The house has been built by Juan of adobe clay dug from the slope and of straw thatch from the barley field. The water supply comes

from a ditch conducting a sufficient amount from the head of the ravine, and the small amount of fuel needed for cooking is of twigs and straw gathered near by. A few metal tools

people of the farm see trucks and trains go by but are untouched by them.

Juan Lleon and his wife are of mestizo blood, Indian and Spanish.



FIG. 237.—Weekly market, dealing mainly in local Indian produce, at Riobamba, 20 miles from the Chimborazo group of farms. View looking northeast.

are almost the only purchases, obtained in exchange for surplus produce (Fig. 237).

Self-sufficiency is not due to isolation from transportation facilities. The main highway and railway lines connecting the capital city of Quito with the outside world both pass the farm. But traffic never stops here, and the

They are proud of the fact that their language is Spanish and not Quechuan. They are intelligent, industrious, friendly, and cheerful. Their four children are bright and healthy. They lack the advantages of modern civilization, but it is not evident that they are worse off than more civilized people.

## 2. CALA CALÍ<sup>1</sup>

### AN HACIENDA IN THE CENTRAL PLATEAU, ECUADOR

Hacienda San Francisco is in an alcove of the Ecuadorian plateau, a small basin among northern spurs of Volcan Pichincha [Figs. 228(2) and 238]. The line of the equator crosses the basin, although this fact is unknown to the inhabitants and is not

indicated by visible evidence in the landscape (Fig. 239). The owner of the hacienda has an impression that the equator is somewhere on his 1,000 acres.

The floor of the basin is filled with brown loam of volcanic origin. The

<sup>1</sup> Field work in January, 1936.

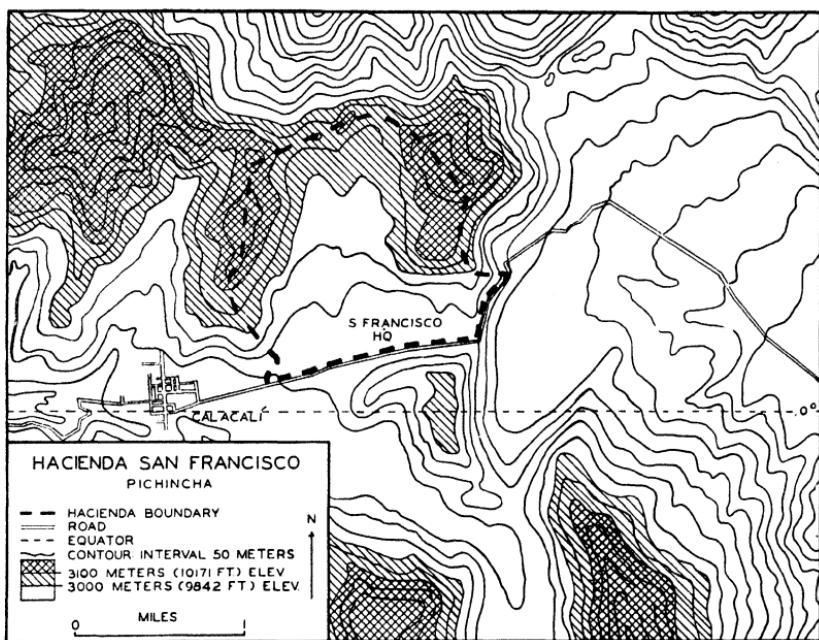


FIG. 238.—Site of an hacienda in the basin of Cala Calí.

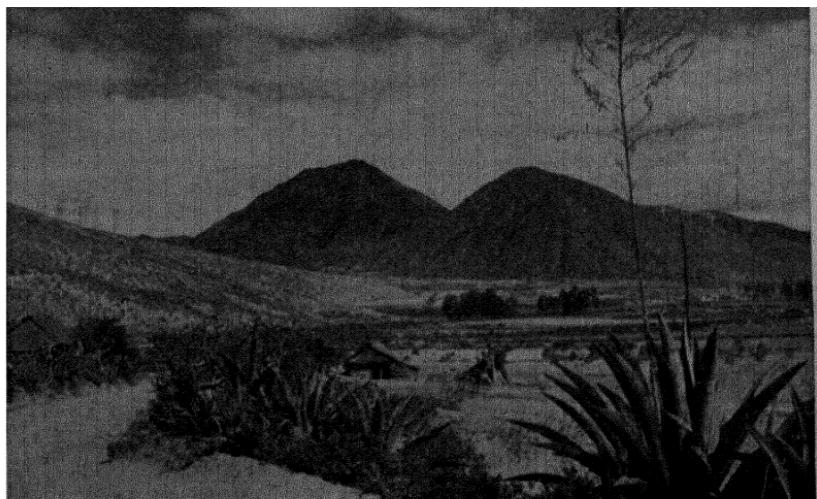


FIG. 239.—Cornfields, farm dwellings, and agave plants, in a neighboring basin east of Cala Calí. Altitude 8,000 feet. View looking north over the equator (which crosses the alluvial fan in the center of the picture).

sides of the basin slope up steeply to the boundaries of the property on the crests of bordering ridges. The major

culture at latitude zero. The margins of the hacienda rise to the zone of grassy paramo. The untilled condition



FIG. 240.—A gang of plowmen, preparing fields for barley, Hacienda San Francisco. View looking southwest.

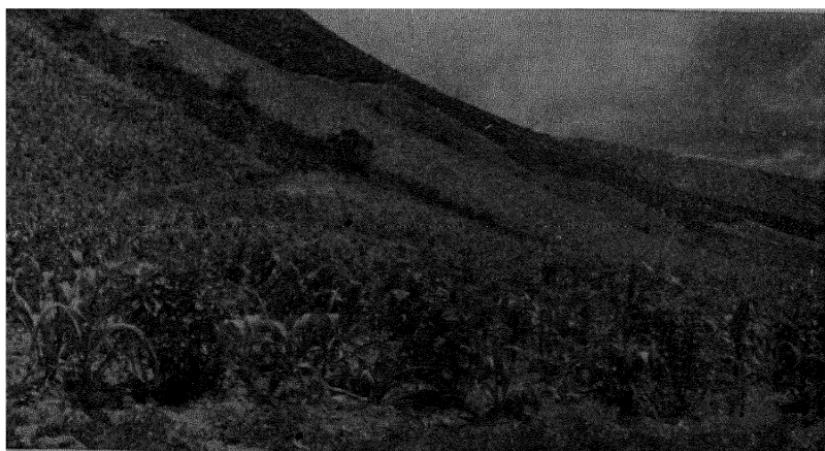


FIG. 241.—Laborers' fields of supply crops on the bordering slopes of the basin, Hacienda San Francisco. Mainly corn; quinoa, the other local cereal, planted with corn, visible in the first row of corn in the foreground. Sheep pasture on ridges above the fields.

part of the property covering the basin floor lies between 9,400 and 10,000 feet above the sea, and therefore is within the climatic range of highland agri-

of these upper slopes is due presumably to steepness rather than to severity of climate; for the highest point is hardly 11,000 feet in altitude, and productive

agriculture extends to greater heights on smooth land elsewhere in the vicinity.

Average temperatures in the basin are moderate throughout the year, warm to cool, with the extremes reaching up to burning heat in bright sun and down to light frost occasionally at night. Precipitation averages about 35 inches annually, distributed through the year, light enough to give an aspect of moisture scarcity to the vegetation.

The fields of the basin are occupied by middle-latitude crops, particularly potatoes and barley. These are produced on a commercial scale by the owner for the market of Quito, 30 miles away. The methods of cultivation are fairly modern and are carried on by laborers, men and women, organized

in the traditional large-scale hacienda way (Fig. 240).

Corn and quinoa are also in evidence in smaller fields extending up the lower parts of the bordering slopes (Fig. 241). These are the familiar native grains of the people and are produced by the laborers on land allotted to them for their own use.

Farther up the slopes is the abundant pasture land of the paramo, and this is utilized by a flock of several hundred sheep supplying wool as another commercial product of the establishment.

The owner is a white Ecuadorian of Spanish descent who lives with his family in the neighboring village of Cala Calí. The laborers are Quechua Indians who live in adobe thatched houses here and there in the basin.

### 3. SAN MIGUEL<sup>1</sup>

#### A BANANA PLANTATION IN THE ECUADORIAN COASTAL LOWLANDS

Hacienda San Miguel is in the alluvial lowlands of the Guayas River system [Fig. 228(3)]. Near by, to the west of the hacienda, are grassy marshes extending almost unbroken to the tidal estuary and Gulf of Guayaquil. To the east of the hacienda are other haciendas and forests extending to the Andes, visible in the distance on clear days.

The climate is of a low-latitude type in which temperatures are high throughout the year. Precipitation is of such quantity and distribution that there is no pronounced season of drought and leaf fall (though the humid aspect of the landscape is due partly to high ground-water level). Irregularity of rainfall distribution is great enough for local designation of a "wet season," when rainfall is heavy and streams are in flood, and a "dry season" when rainfall is much lighter and less frequent and the land surface dries off. The total annual amount of rainfall is about sixty inches (Fig. 4, page 12).

The hacienda is a triangle of 100 square miles between converging tributaries of the Guayas River (Fig. 242). The plain is nearly flat and poorly drained. The only appreciable elevations with relatively good drainage are the natural levees bordering long-established stream channels. There is one such levee bordering the Rio Milagro along the northern border of the property and levees along both sides of the Rio Monos, tributary of the Chimbo, in the southern part of the property.

**CACAO.** Originally, these levees were covered with equatorial floodplain forest. During the past generation, they have been occupied by groves of cacao together with some coffee. The enterprise was developed by white Ecuadorian landowners who lacked opportunity for export production in their grain-growing highlands and found such an opportunity in this adjacent region. Coffee was not of importance at this low altitude, but cacao was in its best type of environ-

<sup>1</sup> Field work in January, 1936.

ment and furnished a high-grade world-market product.

In addition to the higher land of the natural levees, there is enough other land of moderately good drainage to provide farm space for the supply crops

in other countries were able to supply the market more cheaply. Diseases gained a foothold in the old run-down plantations, and production was practically wiped out. Today only neglected

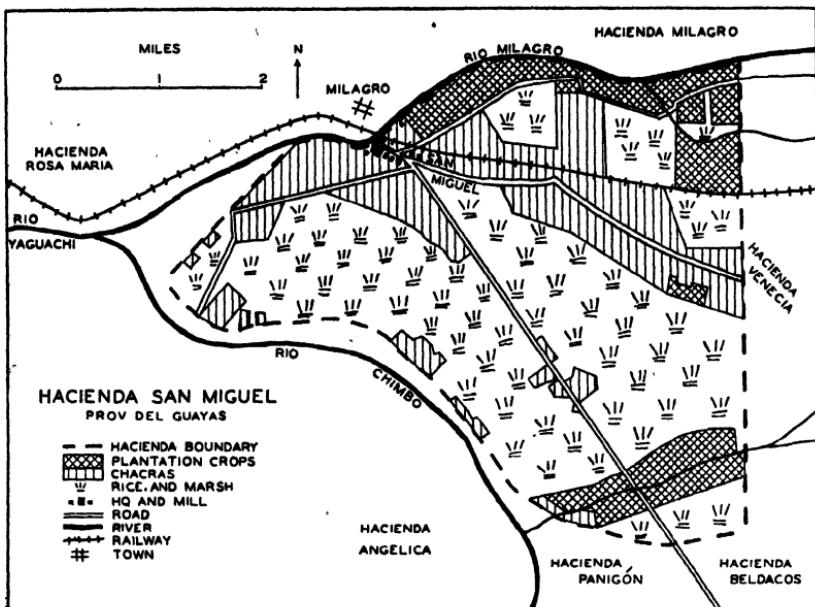


FIG. 242.—Land use in a banana plantation. "Chacras" are small fields allotted to the laborers of the plantation for their own use.

of plantation laborers in allotted tracts. Corn, cassava, vegetables, and fruits are grown. In addition to supplying the needs of families on the plantation, there is even some production of tropical products to market in the near-by highlands. The hacienda has gained a reputation for particularly good pineapples produced by its laborers in their little farms.

Much of the central part of the hacienda is marshland used in the past only as wet pasture for a few miscellaneous animals.

After years of success in cacao production a decline set in. The groves had become old and required expensive intensive treatment in order to main-

remnants of the cacao groves remain (Fig. 243).

The cacao growers were unable to revive the industry or to devise a good substitute. But circumstances quite like those which took away the cacao industry from Ecuador were responsible for bringing in a satisfactory substitute to occupy the land. Banana production declined in old plantations of Central America, handicapped by disease, and North American merchants were impelled to look farther for new banana lands to supply the market. The soil and climate of the Guayas levee lands fitted the requirements, and old cacao plantations were available



FIG. 243.—Abandoned overgrown cacao plantation, Hacienda San Miguel. View looking north, across a natural levee, from stream bank to marshlands.



FIG. 244.—A new clearing on a natural levee, after cutting and burning forest growth, ready for bananas, Hacienda San Miguel. View looking north toward banana plants on the riverbank.

for cheap conversion to new banana plantations.

**BANANAS.** Hacienda San Miguel was acquired by an American and has become a banana plantation. Land on the natural levees is cleared of old

areas have been abandoned to be reoccupied by forest growth.

For the purposes of the new plantation the old labor supply of Indians and mestizos is satisfactorily converted and is augmented from the



FIG. 245.—Banana plantation on a natural levee, Hacienda San Miguel. Trail for transportation by burros from plantation to truck road. Laborer's house at the right.

groves and forest growth, and bananas are planted, as in Central America. Methods are not precisely like those elsewhere, for there is considerable local practice in banana production. For example, in establishing a plantation it is common practice to clear off brushwood by burning after felling and to plant bananas later, instead of planting before felling and leaving the brush to decay (Fig. 244).

First plantings were made at any convenient places along the natural levees. Now it has been found that not only conspicuous differences in soil drainage and texture but also slight differences in soil composition are to be considered. By trial and error, planting has been extended in more productive areas, and unproductive

highlands to meet the intensified labor requirements of the new crop.

The most important difference in the new product is in its harvesting and transportation requirements. Whereas cacao is a nearly imperishable product to be gathered, treated, and transported at leisure, the banana is a highly perishable product to be harvested in large quantities at one time and transported quickly to market. Therefore, more labor is required at certain times. Moreover, pack trails have become inadequate for internal transportation, except for the first few rods in the plantations (Fig. 245). Therefore, trucks and truck roads have been provided to transport the crop to the railroad shipping point, whence it is carried on to the port of



FIG. 246.—Banana truck mired on a plantation road at the beginning of a rainy period, Hacienda San Miguel.



FIG. 247.—Rice fields in marshland, Hacienda San Miguel. Banana plantation and old cacao grove along a natural levee in the background.

Guayaquil for shipment on an American liner at a scheduled time. Grace Line ships have been fitted with special refrigeration equipment to carry the new Ecuadorian product to New York.

Truck transportation within the plantation is the weakest link in the chain because of impassable mud during the wetter season (Fig. 246). Therefore a narrow-gauge tramline system is being planned to replace the trucks. Meanwhile, some participation is possible without immediate modernization of local transportation facilities, and small producers still transport bananas by pack animal to the river bank and thence by raft to Guayaquil.

**RICE.** The little farms of supply crops remain much the same as they were before the change from cacao to bananas. But a new use has appeared

for marshlands. With very little improvement, they have been found suitable for rice growing, being flooded naturally during the season of high water without special irrigation and drying off sufficiently for the harvest period (Fig. 247). This industry, like the production of supply crops, is carried on by independent laborers in allotted tracts. The hacienda has a mill for handling the product, which is shipped by rail to the highlands for consumption in the country.

The owner of the plantation has other interests and spends 6 months of the year in the United States. In Ecuador, part of his time is spent at the hacienda, where he has a comfortable bungalow, and part on the plateau, where he has a residence near Quito.

#### 4. RIMAC AND CHILLÓN<sup>1</sup>

##### IN THE PERUVIAN COASTAL LOWLANDS

###### a. ZAVALA COTTON PLANTATION

Climatically the Peruvian coast is a desert. But it is not deserted. Numerous rivers descend from the highlands to the sea and have available space for irrigation in the coastal lowlands near their mouths. Among lowland oases a conspicuous one is that of the adjoining Rimac and Chillón valleys [Fig. 228(4)]. Here are many plantations, of which two have been selected for observation (Fig. 248).

One of these is the Hacienda Zavala in the Rimac Valley 5 miles above Lima. Its owner is a man of affairs, a Peruvian of Spanish descent, who lives in the city but gives much attention to the management of the plantation. Hired laborers number 30 through the year, increasing to 200 in the harvest season, mestizos and Indians.

The establishment consists of 1,000

acres of alluvial land beside the river, irrigated by a network of canals ramifying from gates in a main canal (Fig. 249). An almost imperceptible ridge paralleling the river and followed through the property by the valley railway and highway is used as a divide in the grading of the irrigation system. Field divisions of about forty acres have been laid out with reference to efficient irrigating and plowing, with a width of 220 yards for the flow of water in furrows and a length of 880 yards for the use of large-scale machinery (Fig. 250).

Cotton production for export is the purpose of the establishment. The district is well-fitted to compete in the world market. Sunshine and warmth through much of the year and no period of frost, an insignificant amount

<sup>1</sup> Field work in January, 1930. R. S. PLATT, Six Farms in the Central Andes, *Geographical Review*, Vol. 22 (1932), pp. 254-259.

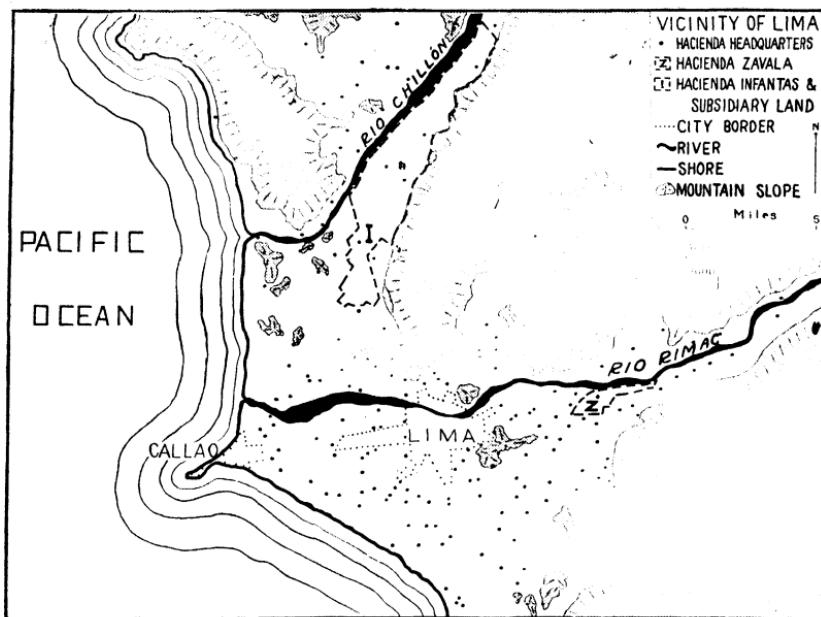


FIG. 248.—Lower courses of Rimac and Chillón valleys, showing location of haciendas. (Data from J. A. de Laralle, "Las necesidades de guano de la agricultura nacional," Mapa 8, Cia. Administradora del Guano, Lima, 1916.)

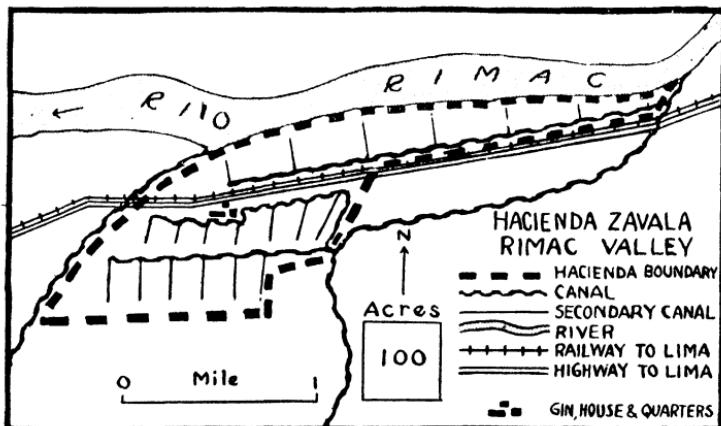


FIG. 249.—Irrigation pattern of a cotton plantation.

of rainfall averaging about two inches annually, a dependable supply of water sufficient for cotton, fertile

by enervating heat, a national familiarity with cotton growing—these are circumstances leading to a high yield

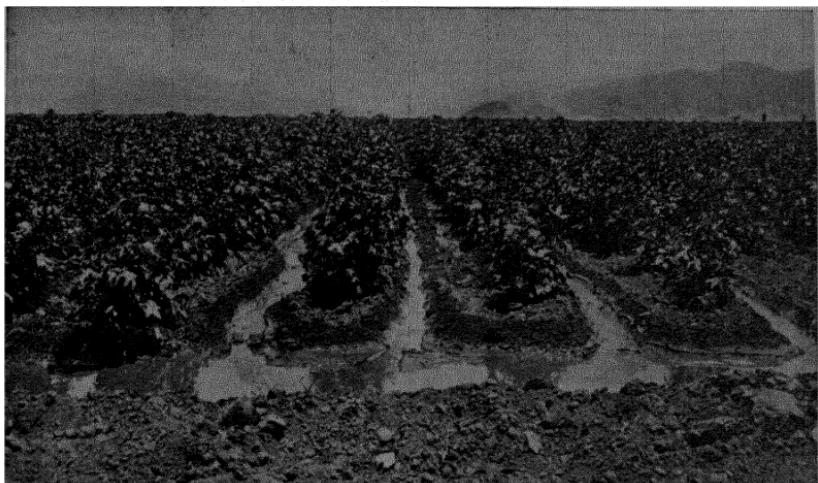


FIG. 250.—First-year cotton under irrigation, Hacienda Zavala. View from the lower end of furrows looking eastward up the Rimac Valley.

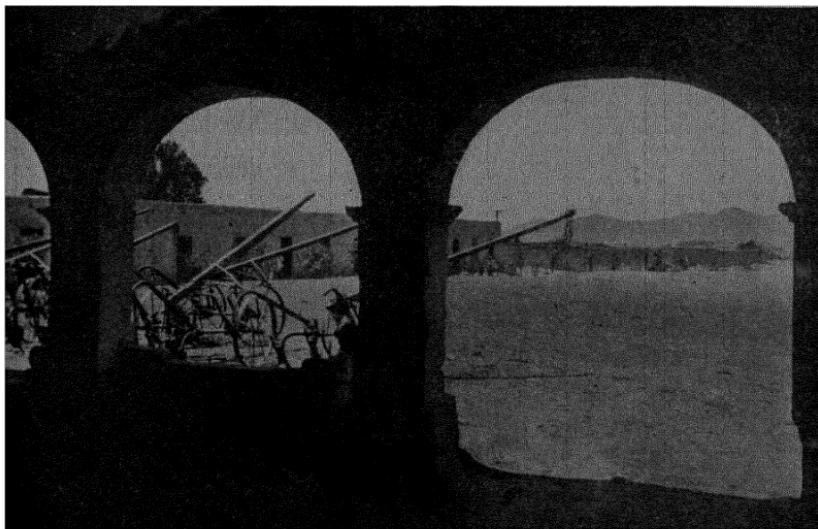


FIG. 251.—Farm machinery and laborers' houses seen from the porch of the owner's house, headquarters of Hacienda Zavala.

soil, cheap fertilizer from guano islands, near-by ocean transportation, a satisfactory labor supply never hampered

of high-grade cotton efficiently produced and delivered. The average production of the plantation is one and

one-fifth bales of Tangüis<sup>1</sup> cotton per acre.

In view of the frost-free winter, replanting every year is unnecessary; cotton is left for 3 years or more,

work animals. After 3 years of alfalfa, cotton is planted again; or if the soil has become too compact, corn is grown for a year to loosen it before the return to cotton.

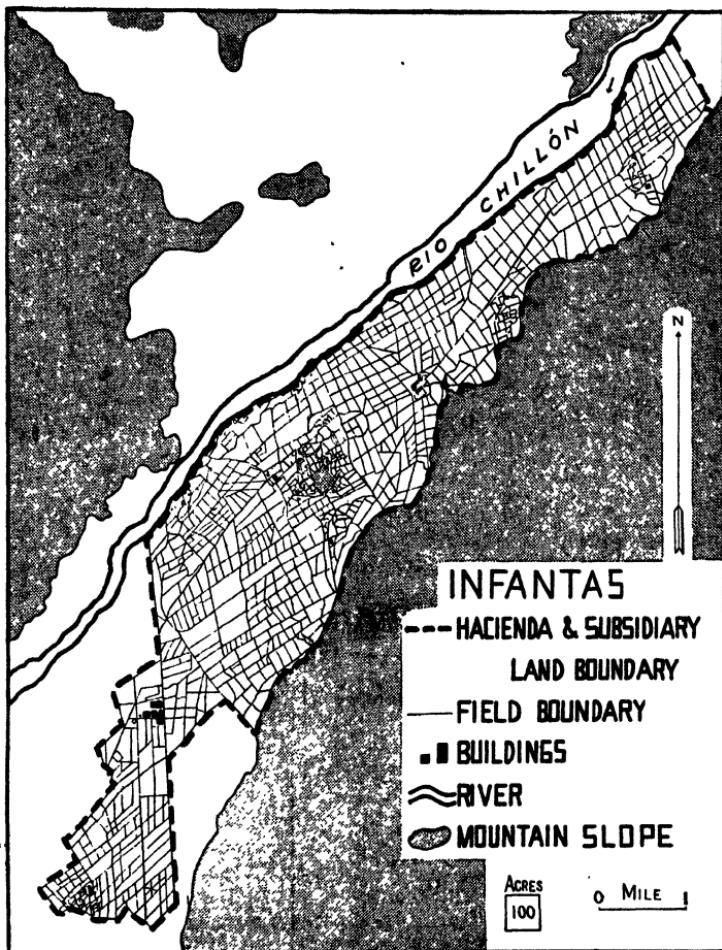


FIG. 252.—Field pattern of a sugar plantation.

producing a crop every autumn until weeds become too abundant and cotton growth irregular. Alfalfa is then grown in rotation to restore the soil, the product being used to feed the

Field operations are carried on efficiently with modern American farm machinery and European oilburning tractors, supplemented by mules and oxen for work in which they are more

<sup>1</sup>A resistant, high-yield, long-staple Peruvian type of cotton.

efficient. Harvesting is a hand operation, as elsewhere; but there is efficient transportation of the crop by burros in the fields and by trucks over a plantation system of roads focusing on a well-equipped gin near the railway.

Storehouses and barns are unnecessary in the warm desert climate, and the group of laborers' houses is small and simple. The owner's house is a mansion, occupied intermittently (Fig. 251).

#### b. INFANTAS SUGAR PLANTATION

Large and well-organized commercialized plantations are typical of the district. Cotton, however, is not the

of 1,500 acres, but to this have been added four adjacent plantations bringing the total acreage to about 8,000.

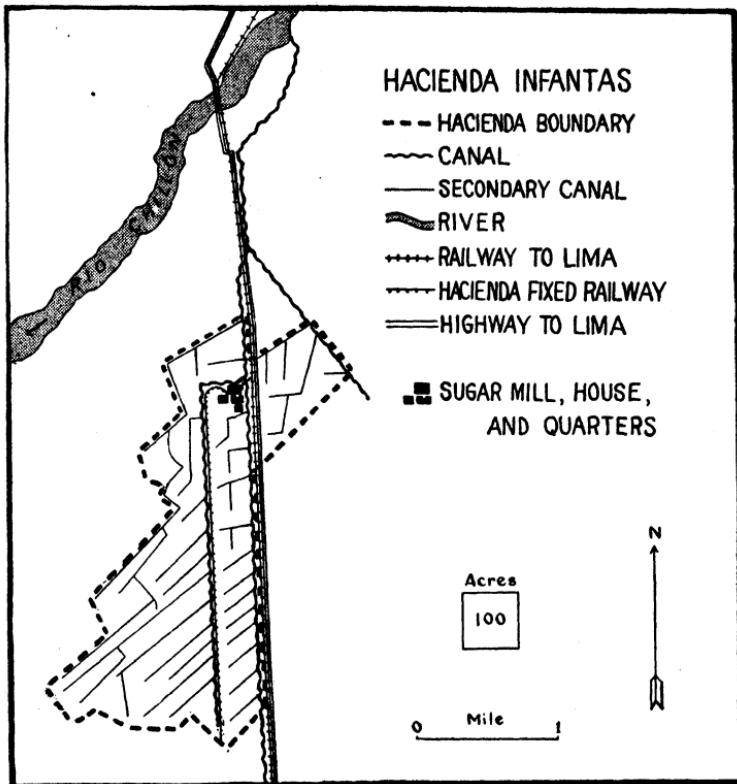


FIG. 253.—Irrigation and transportation pattern of the parent plantation, Hacienda Infantas.

only important product, and another type of establishment is represented by the Hacienda Infantas 5 miles north of Lima in the Chillón Valley (Fig. 248).

The original plantation had an area

Ownership is by a corporation, organized by French capitalists, which has passed successively under the control of Germans, then of Americans, and now of Peruvians. A manager presides at the plantation with a staff of tech-

nicians and clerks and a labor force of 1,000 men.

Large land control, capital investment, and labor employment here reflect the needs of a modern sugar establishment. Conditions mentioned

Each of the constituent plantations of Infantas has its own water rights and system of canals irrigating a pattern of fields long ago laid out to conform to the gentle slopes of the alluvial plain and to the exigencies of

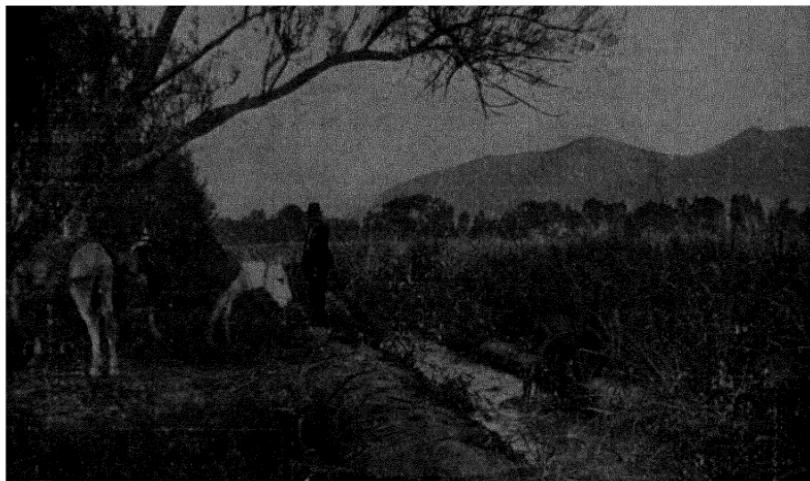


FIG. 254.—Irrigation ditch carrying water along the side of a field of immature cane, Hacienda Infantas. Assistant manager and laborers' burros at the left. View looking east up the valley.

as advantageous for cotton in the district are for the most part advantageous also for sugar, another of the lower latitude agricultural products with a great middle-latitude market.

Because there are some differences between cotton and sugar not only in capital and land-unit requirements but also in growing conditions, there is some tendency to localization of production, even though most of the irrigated land in the district is in general suitable for either crop. The Chillón Valley has generally more water per unit of land to be irrigated but a less dependable supply than the Rimac, owing to a less snowy watershed. Therefore, as a Chillón crop, sugar is somewhat more suitable than cotton, which requires less water but is more injured by drought at critical times.

watering and cultivating (Figs. 252, 253, and 254).

For the combined properties a central mill has been established at the headquarters of the parent plantation beside the valley railway and highway. Focusing upon this plant is a narrow-gauge railway system reaching every section of the area and fed by portable tramways that reach every field. By this means is accomplished the task of transporting the crop to the mill, a task so many times greater in bulk per acre than the transportation of cotton to the gin as to make the latter seem simple in comparison.

As in the case of cotton, the yield of cane is higher than in many other countries, giving six harvests from one planting and still averaging annually 40 tons an acre at Infantas. The dense growth makes harvesting difficult, and

to facilitate it the burning off of leaves is regularly resorted to under carefully regulated conditions (Figs. 255 and

lows the spread of operations through 10 months of the year by the planting of varieties of cane that vary in their



FIG. 255.—Opening a fire line through dense growth of mature cane, in preparation for burning off leaves, Hacienda Infantas.



FIG. 256.—Cane after burning, ready to harvest, at a plantation in the Chicama Valley, near Trujillo.

256):  $\frac{1}{2}$  acre at a time is isolated and burned, and the cane is then cut and milled promptly to avoid loss of sugar content. The seasonal uniformity al-

period of growth from 12 to 22 months. The 10 months' harvest leaves the two cooler months of July and August for reconditioning the mill.

In recent years of depression in the world market for sugar, there has been some curtailment of production. Part of the Infantas land is now in cotton, which has suffered less from over-production and tariff barriers; and perhaps further diversification will be possible.

The coastal region is the heart of

modern Peru. The center of gravity slipped from the highlands to the coast at the time of the Spanish conquest, when intercourse by sea became more important than seclusion; and now coastal dominance is further entrenched as commercial agriculture surpasses subsistence production in national importance.

### 5. TALARA OIL FIELD<sup>1</sup>

#### IN THE PERUVIAN COASTAL LOWLANDS

Near the westernmost point of South America on the northern coast of Peru is a petroleum deposit [Fig. 258(5)]. The accumulation is associated with block faults in sedimentary

obtained some pitch from seepages here. But oil-well production is very recent. The field is under unified control within a Spanish grant property belonging to a Canadian sub-

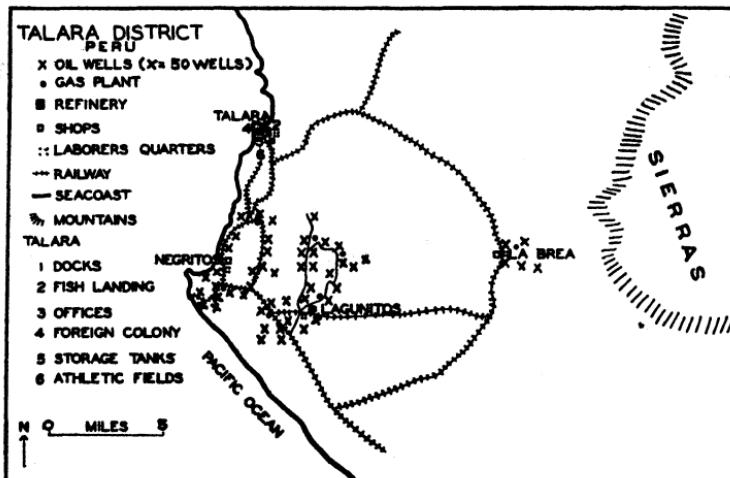


FIG. 257.—Talara petroleum district.

rocks of the coastal plain. The average depth is about two thousand feet. The area of the field is irregular but well-defined, extending inland from the seashore (Fig. 257). The product is light and has some gas associated with it, although it is not under much pressure.

Possibly in prehistoric times Indians

subsidiary of the Standard Oil Company of New Jersey. The first wells were drilled at random in convenient spots. Then systematic spacing was adopted, and regularity now characterizes development of proven areas, 600 feet between wells being considered the proper distance for emptying pools efficiently. Most of the wells require

<sup>1</sup> Field work in January, 1930. R. S. PLATT, Mining Patterns of Occupance in Five South American Districts, *Economic Geography*, Vol. 12 (1936), pp. 348-350.

pumping. The flow of oil is stimulated by gas drive, forcing surplus gas into some of the nonproducing wells.

About twenty-five hundred wells have been drilled, of which 1,700 are productive. The daily output is about

clusters of shops and dwellings for housing the more mobile labor and more widely ranging overseers. At one point the tank farm, refinery, and dock are located. This is the port of Talara, on which traffic lines converge.

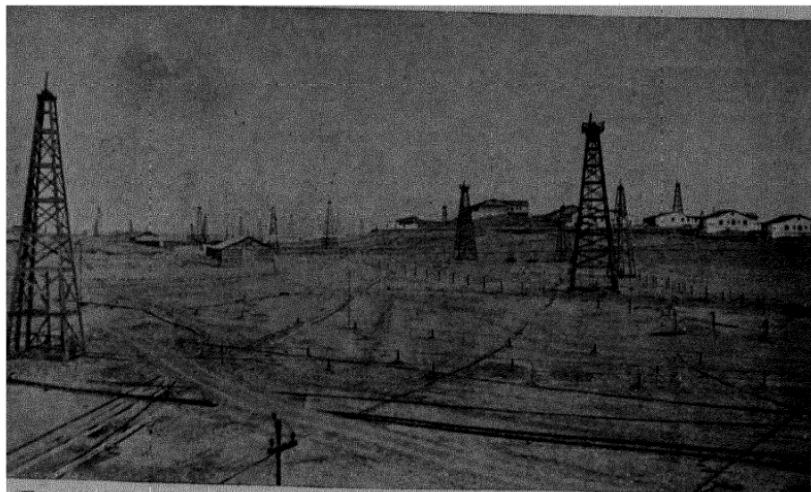


FIG. 258.—Oil wells in the Talara District. Pipes on the ground, pumping cables on vertical posts, motor road in the foreground, dwellings and shops in the background. View looking east from a gas separator, Lagunitos.

thirty thousand barrels of crude oil and sixteen hundred barrels of gasoline recovered from gas.

Field operations are distributed over the area. Here is a widespread active network of oil, gas, and water pipes, electric wires and pumping cables, railways and roads; and a wide distribution of small associated establishments (Fig. 258). Thus pumps are distributed over the field, one for every 15 wells, each a focus of short cables; and gas separators one for 15 wells, to consolidate trunk lines close to the source of production. Laborers' dwellings are distributed in about the same proportion (Fig. 259).

Focal establishments of larger scale are more localized. Such are gasoline plants, one for every 15 gas separators, a total of seven in the field. At three points in the traffic system are

None of the establishments corresponds in function to the stamp mill at a mine, for in this case there is no waste matter to be eliminated. The oil refinery does not produce a more transportable product but only separates products, which thereafter require more careful handling than the original mixture. The Talara plant refines only enough for local distribution, and almost 90 per cent of the field output is shipped in crude form toward other markets.

The regional circumstances are not unfavorable, thanks to beneficent cold sea water. The equable weather of the desert constantly prevails. Pipes and wires lie exposed on the ground (Fig. 258). Roads have wind-breaks to scour off drifting sand but otherwise need little care (Fig. 260). Importation of workers is required;

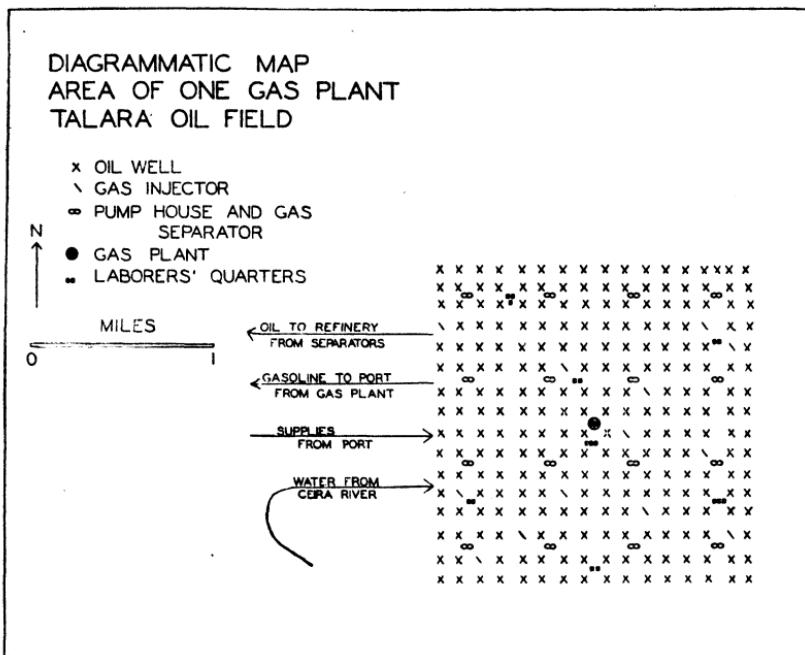


FIG. 259.—Regular arrangement of wells and associated establishments.

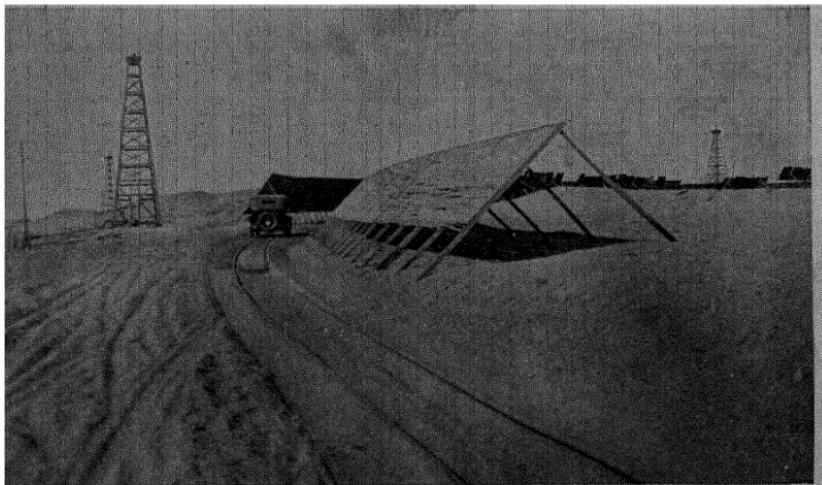


FIG. 260.—Windbreaks to keep tracks clear of sand, Talara District.

the 3,600 laborers are mostly from the Peruvian highlands, and there is a staff of 200 foreigners from North America and Europe. Food and other supplies are imported, but the oil is an adequate source of power. Water is piped from a river 20 miles away.

The coastal-plain location of the field close to the harbor of Talara gives access to world routes for the inflow of supplies and the daily outflow of 5,000 tons of oil, the bulk of it shipped to North America and Europe.

## 6. CHICHAUSIRI,<sup>1</sup> 15,000 FEET

### A SHEEP RANCH IN THE HIGH HIGHLANDS

Hacienda Chichausiri occupies a part of the intermont plateau basin of Junín in the heart of the Central

equator, the climate is cool, and killing frost is common in every season. The hacienda is above the range of agri-

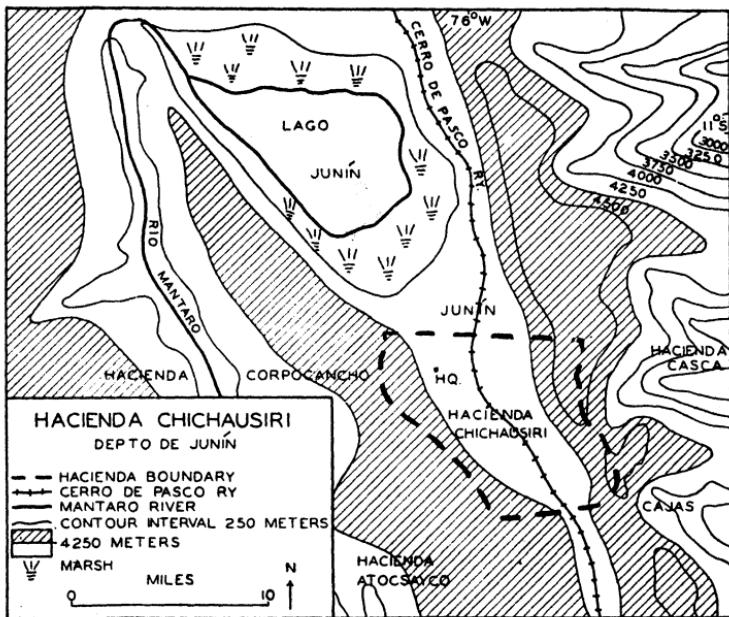


FIG. 261.—Site of a sheep ranch. (*Contours from American Geographical Society compilation.*)

Andes [Fig. 228(6)]. The lowest part of the basin floor in the center of the hacienda has an altitude of about 14,000 feet above the sea. From this center, outlying edges of the property rise to about 15,000 feet on the rounded crests of bordering ranges. It has an area of 100 square miles (Fig. 261).

At such an altitude within 12° of the

cultural crops. Precipitation is about twenty inches annually, distributed through the year. With low-hanging clouds and low evaporation the landscape has an aspect of moderate moisture. The basin floor and adjacent slopes are green with grasses and other herbaceous plants. Pasturage is the resource that gives value to the

<sup>1</sup> Field work in December, 1935.

property. Presumably it had very little value as a Spanish grant in Colonial times. Now organized as a productive enterprise owned by a Peruvian company and managed by an expert Peruvian sheep raiser with

after clipping the sheep are washed and then returned to their range.

Other livestock are kept for supply purposes: 300 cattle to provide milk, butter, and beef; 60 riding horses as a means of going about in the hacienda;



FIG. 262.—Flock of sheep in the intermont basin area, Hacienda Chichausiri. View looking south.

100 Indian shepherds, it forms a valuable establishment.

It is stocked with 32,000 sheep, 1 head in 2 acres (Fig. 262). The animals are well bred for wool production and adaptation to the local environment. They are a cross of imported Ramboillet rams and local criollo ewes descended from stock introduced in Colonial times. The total number is divided into flocks of 400 to 1,000, and these are distributed over the hacienda, each with its allotted range in the basin or on bordering slopes and each under the care of one or two shepherds established on the range in a small house. Once a year, each flock is brought to the headquarters of the hacienda for clipping. This is generally in March, the wettest period of the year, 2 months before the beginning of the colder season. The per capita clip is about five pounds. Two weeks

and many dogs (Fig. 263). There is a small field of planted fodder at headquarters, the only sign of cultivation in the hacienda. Barley is used for this purpose and produces a good stand of green fodder, though not ripening grain.

One other animal is fairly abundant in the hacienda, the skunk. This is trapped for its pelt, thus providing a small supplementary item that like the chief product, wool, is transported from the hacienda to Lima and the outside world. Transportation is not a problem of the establishment. The Cerro de Pasco Railway traverses the basin (Fig. 261) en route from the mining district to the smelter at Oroya and thence to the coast; and the hacienda has its own station.

The areas adjacent to the hacienda on every side are similarly used. Other pastoral haciendas lie beyond the

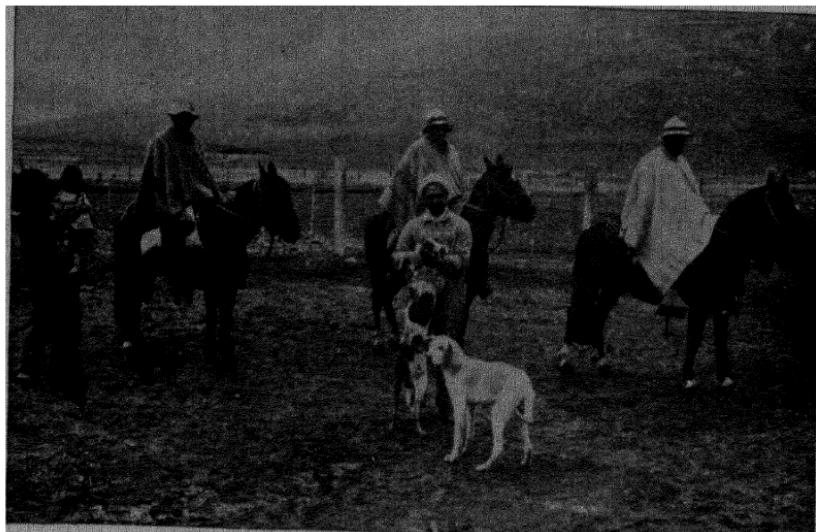


FIG. 263.—Foremen gathered at headquarters, Hacienda Chichausiri. View looking west from headquarters building.

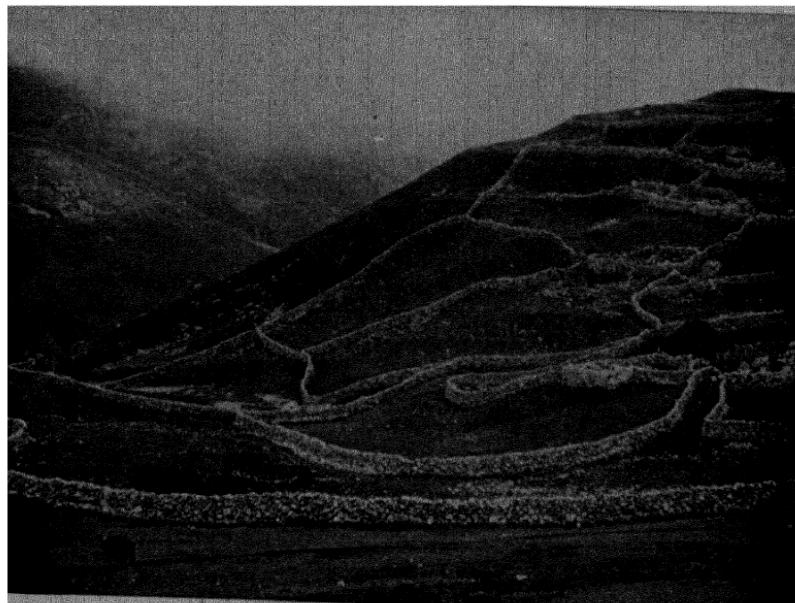


FIG. 264.—Corrals and shepherd's house of a pastoral Indian pueblo (Cajas), neighbors of Hacienda Chichausiri. Altitude 14,000 feet.

ranges east and west, and pastoral Indian communes adjoin the property along the plateau basin north and south (Fig. 264). The haciendas specialize in commercial wool production, and their flocks are at least slightly improved with imported stock. The communes are uncommercialized. Their flocks, composed of the family livestock of many owners, are unselected criollo sheep, black as well as white, and include also llamas and

alpacas. This motley assortment supplies meat as well as clothing for the families to which they belong and some surplus to be exchanged with neighbors in the lower agricultural zone near by for other needed supplies. Houses are built of stone, sod, and grass. Bushes, lichens, and peat furnish fuel for cooking. Therefore the communities are nearly self-sufficient and thus contrast with the commercial haciendas.

## 7. SAN GERÓNIMO,<sup>1</sup> 10,500 FEET

### A FARM IN THE CUZCO VALLEY

Not far from the level of Lake Titicaca is land above the limit of possible self-sustaining settlement. The reputation of the lake for great elevation tends to obscure the fact of its low elevation with reference to its surroundings. Now, as in the past, population clusters on the more attractive lands about the lake below the colder and rockier mountain and plateau heights.

The antiquity of these lake communities is well-known—they are perhaps the oldest agricultural settlements in the Andean region. The combination of advantages, including escape from the disadvantages of tropical lowlands, was satisfactory even with the native crops—potato, oca, and quinoa—and native livestock—llama and alpaca—before the introduction of the European barley and bean, sheep and donkey. Yet in the extreme simplicity, which favored the start of civilization, there is the limitation of resources for greater progress. Land farther below the altitudinal limit of agricultural settlement has greater possibilities.

Lower land suitable for agriculture is lacking near Lake Titicaca. But there is lower land beyond the lake basin. On the Peruvian side northwest

of the lake, the long valley of the Rio Pucará extends up to a high divide, an easy travel route. Beyond the divide a descent begins down another valley, the Vilcanota. The valley becomes a narrow gorge; but at about 10,500 feet, before its downward plunge to the Amazon, there enters a small tributary valley, which is not a gorge. This is the Cuzco Valley [Fig. 228(7)].

**CUZCO VALLEY.** Where it enters the main gorge, the Cuzco Valley is narrow, with a bottom width of only about two hundred yards (Fig. 265). Farther up it opens out in a broad strip of fertile land. Several tributary streams enter from the sides; and at the head, 20 miles up from the valley mouth, the city of Cuzco is perched. In the valley is a numerous population. The land is occupied and firmly held. Much of the property belongs to large estates; but the several Indian villages also have some rural holdings, and there is a considerable number of small independent farms.

The subject of this study is one of the small farms, San Gerónimo (Fig. 265). The owner is a mestizo with more Indian than white blood in his veins. He has a wife and nine children, most of them young. They speak Spanish

<sup>1</sup> Field work in February, 1930. R. S. PLATT, Six Farms in the Central Andes, *Geographical Review*, Vol. 22 (1932), pp. 248-251.

and live in a house quite roomy and substantial, although built of adobe and roofed partly with thatch and

for the harvest season. They have a plow drawn by oxen but use hand tools for most other operations.

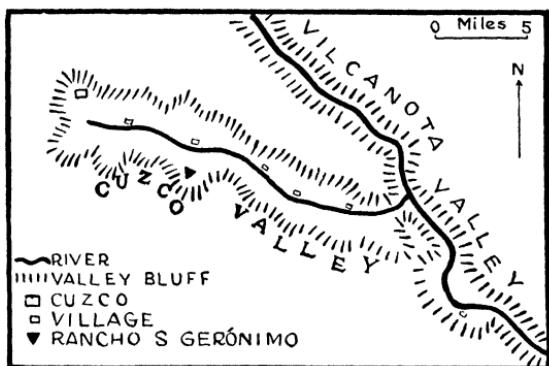


FIG. 265.—Form of the Cuzco Valley and location of Rancho San Gerónimo.

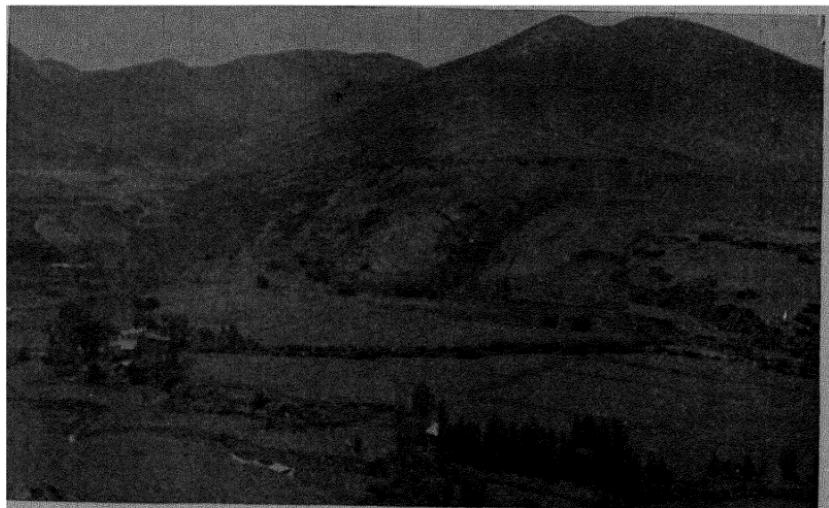


FIG. 266.—Rancho San Gerónimo, viewed from the eastern slope of the tributary valley, looking southwest. Tributary stream in the foreground flowing to the right with its left fork coming in from the left background. Line of high-level irrigation canal midway up the opposite slope, with grassy pasture above and wheat fields and gullies below. Corn on the flood plain and low terraces. House of San Gerónimo in the left middle distance where the trail crosses the stream fork. The farm is a triangle bounded by the trail, the stream fork, and the west slope.

partly with tile. The farmer and his family do the field work through the year aided by several Indians hired

The farm is situated on a low terrace of one of the tributaries close to where it joins the main valley (Fig. 266). The

22 acres of land are irrigated by water from the tributary stream, conducted along the valley side by a high canal, poured down the slope from the canal in due allotment, and distributed to the furrows of the 10 fields—a land division representing convenience in

in the spring, in September instead of October. Thus time is allowed for slower growth, but a greater frost hazard is involved. The rainfall is often insufficient but is adequately supplemented by ample irrigation.

Besides corn the farm has other crops

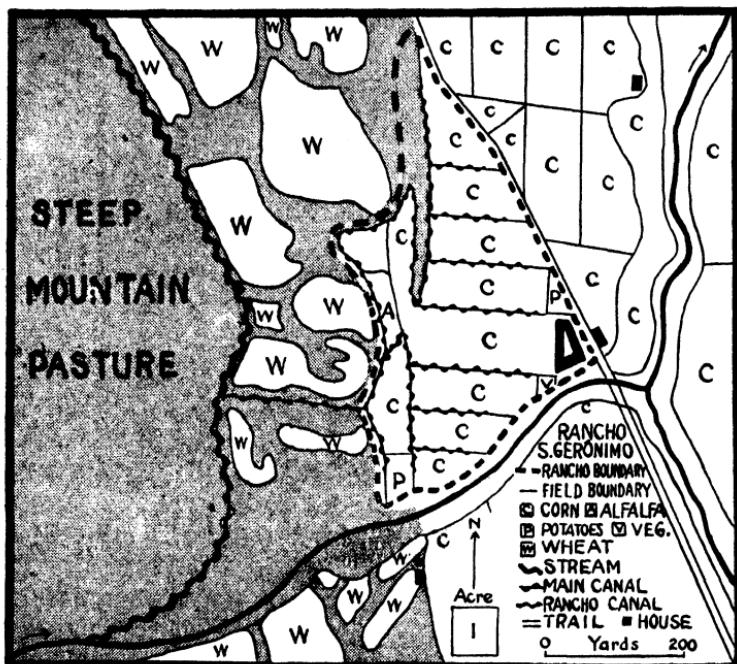


FIG. 267.—Crops and irrigation pattern of a corn farm in the Cuzco Valley.

small-scale operations and in irrigating gentle slopes (Fig. 267).

Corn, the best native cereal, is the crop that occupies the land, grown year after year as the one important product, yielding dependably, and providing food for the family and a surplus for sale in the town. Temperatures are not high at 10,500 feet, and consequently the growth of corn is slow, taking 7 months from planting to harvest; but the frost-free season is long enough for this. Planting at higher elevations takes place earlier

tucked away in corners of fields for home supply. Haba beans grow mixed with the corn; here and there are rows of quinoa and a little barley; near the house are patches of potatoes, cabbage, and other vegetables; and one small field is occupied by alfalfa.

Although no pasture land is included, livestock has an important place in the farm. There are 20 sheep providing wool for the family and some for sale, four oxen for field work, six cows for milk and cheese, and six horses for pack and riding purposes.

The sheep are pastured on the grassy mountain slopes above the valley, land owned by large estates, which charge a small rental for grazing rights.

In summer the larger animals also are grazed on the mountains; but for

of soil among the steeper and stonier parts of the slope; and wheat is the crop occupying them, a summer crop, from November to June (Fig. 267). Wheat does not require irrigation; in fact, it grows better without it, for production

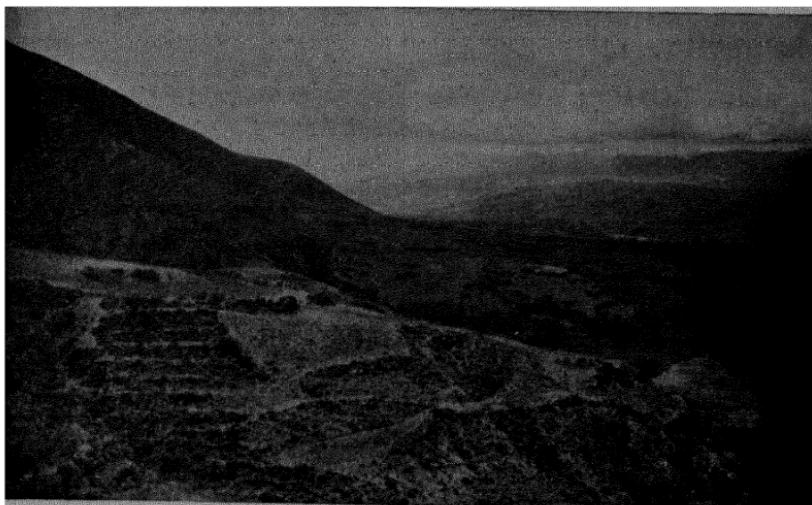


FIG. 268.—Pre-Columbian terraces for irrigation, no longer used. The unirrigated wheat crop now occupies sloping fields on the valley sides. Rancho San Gerónimo is in the tributary valley at the left. Cuzco is behind the high spur in left center. View looking northwest, up the Cuzeo Valley.

more than half the year, during the cooler season from April to October, they are kept on the farm, feeding on cornstalks and other incidental fodder and supplying manure with which to fertilize the overworked cornfields.

Between the high pastures on the mountain and the farm in the valley is a zone of cultivable but unirrigated lower slope on the valley side belonging to an Indian village. Apparently the aboriginal community has been able to retain its hold on this intermediate strip of land, less coveted by the conquering whites than was the irrigated valley and more steadfastly occupied by the Indians than was the uncultivable highland pasture (Fig. 268). The fields are irregular patches

on irrigated land is accompanied by difficulty with rust.

Although the San Gerónimo farm represents only one of several types of land tenure in the district, it is fairly characteristic of farming methods in general, whether of large estates, Indian communities, or small farms. The estates commonly are not operated as large units but are more or less divided up among tenants, and community lands are parceled out among members.

It is apparent that the Cuzco Valley is more productive than higher areas of the plateau. At elevations lower than Cuzco are habitable lands of other sorts.

## 8. AREQUIPA BASIN, AND BELOW<sup>1</sup>

### a. PACHACUTE, 7,500 FEET

Desert appears on the western slopes of the Maritime Cordillera not far below the edge of the moist plateau. Habitability is not characteristic of desert mountain shoulders, but some

pampas toward the sea. The Arequipa basin has an elevation of 7,500 feet.

The Pachacute Farm is adjacent to and watered by the highest of the irrigation canals diverging from the

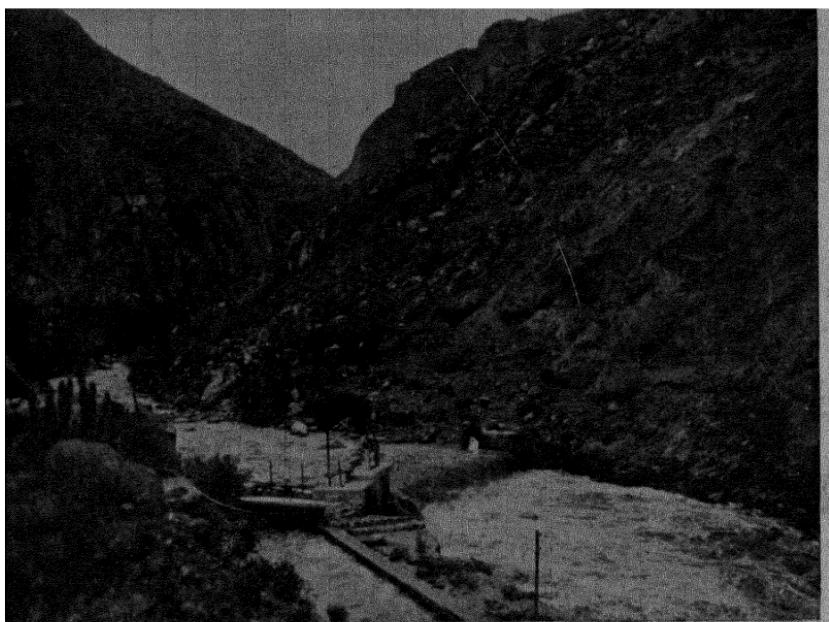


FIG. 269.—Canyon of Rio Chili just above the Arequipa basin, the main source of water for the basin. Diversion dam and head gate of the highest canal. View looking northeast, upstream.

places in this elevated border zone are attractive to population. The best of these is the district of Arequipa [Fig. 228(8)]. Here the Rio Chili, tributary to the Rio Vitor, breaks out from a gorge between snow-capped volcanic peaks (Fig. 269) into a broad alluvial basin at the foot of the Cordillera, before plunging on through a deep canyon across the high desert

river as it leaves its gorge (Fig. 270). Following the edge of the basin the canal makes sharp distinction between irrigated fields on the side below it and unclaimed desert slopes on the side above. The farm is in an alcove of irrigated land bordered by desert and has an area of 60 acres (Figs. 271 and 272). In shape and size, its fields con-

<sup>1</sup> Field work in February, 1930. R. S. PLATT, Six Farms in the Central Andes, *Geographical Review*, Vol. 22 (1932), pp. 251-254.

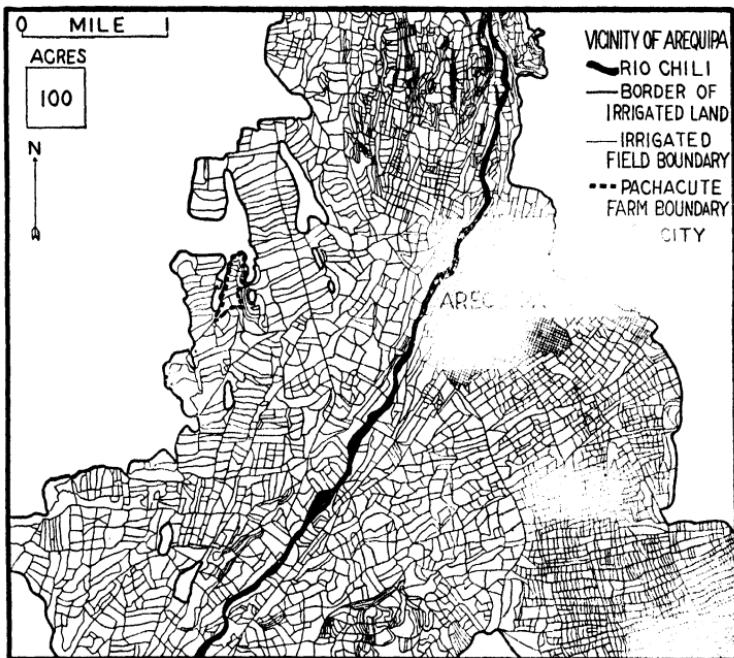


FIG. 270.—Pattern of irrigated fields in the Arequipa basin, showing location of Pachacute Farm.

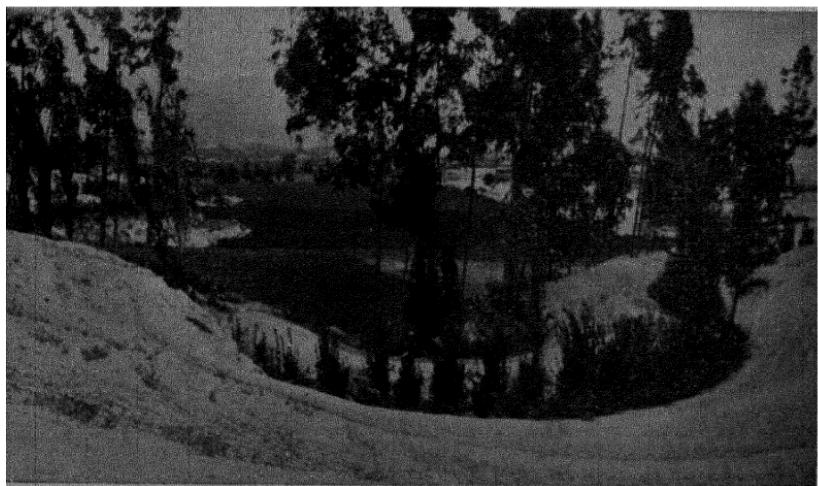


FIG. 271.—Pachacute Farm seen from unreclaimed desert at the northern end. The irrigation canal follows the line of trees in the foreground. Alfalfa in nearer fields, corn and wheat beyond.

form to the contour of the land at the margin of the basin.

The owner and his family, of mestizo blood, live comfortably in a rambling one-storyed house. Field work is performed by hired laborers of Indian

small farm reservoirs provide sufficient regulation. The crops succeed each other in rotation on the same land; and, in general, somewhat better methods of production are used, reflecting a higher degree of com-

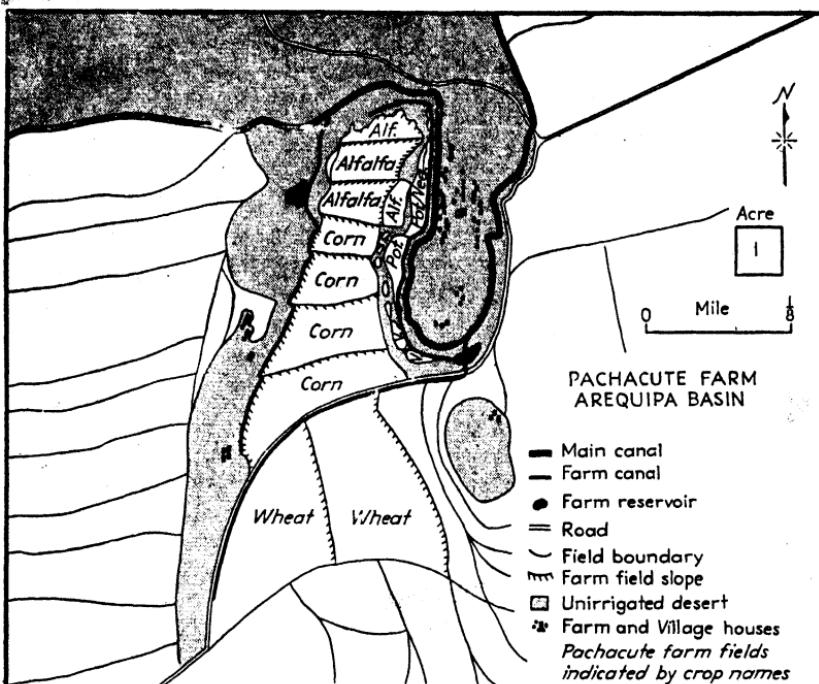


FIG. 272.—Field pattern of a farm in the Arequipa basin.

blood (Fig. 273). Dwellings not only for these workers but also for those of other farms are clustered on the edge of the unirrigated desert, and thus the use of crop land for this purpose is avoided.

The same crops appear as in the Cuzco Valley—corn, wheat, alfalfa, and potatoes—yet farming is of a very different sort. At this lower altitude, temperatures are higher and more favorable; scantiness of rainfall confines farming to irrigated land, but for this an abundance of water is available through a well-organized system. There is no large reservoir in the system, but

commercialization, even though operations here also are on a small scale, with hand tools rather than machinery.

Commercialization involves production of crops primarily for sale rather than for family supply. The products are not for distant markets either downward or upward but such as are in local demand; for Arequipa is a focus for highland trade, and its productive land is not extensive. Even alfalfa is for direct sale either as hay, for which it can be harvested five times a year, or in rented pasture. Alfalfa is the most profitable of the crops, because of the considerable movement

of livestock from the plateau grasslands down to this district in which natural pastures are lacking.

ers in small patches. Among the purpose: corn, potatoes, squash, and other vegetables.

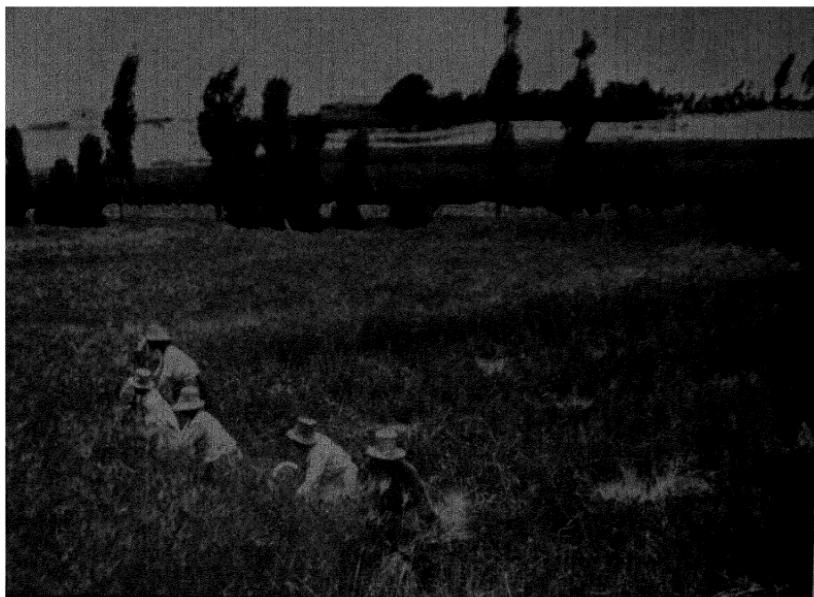


FIG. 273.—Women harvesting wheat with sickles, Pachacute Farm. View looking west across the southern fields of the farm.

Crops for human food occupy more land than alfalfa; corn, the old favorite of the region for both food and drink; winter wheat, equally conspicuous; and occasionally potatoes in rotation. In addition to the field crops, supply products are grown by the farm work-

Higher yield of all the crops is dependent on a favorable combination of conditions. The district is productive and attractive, although small in area and lacking some of the simple resources of the plateau as well as special resources for export.

#### *b. SOTILLO, 4,000 FEET, IN THE VITOR VALLEY*

At a lower elevation the same river in its descent presents more strikingly the handicap of lack of irrigable land in the desert though coupled with an abundance of water. Another place of observation is at an elevation of 4,000 feet. Irrigation has been confined to the deep valley of the Rio Vitor (Fig. 274), leaving unoccupied the desert pampas a thousand feet above (Fig. 275)—at least until the construction of a long canal to bring water

from a different source far up in the mountains.

The Sotillo Farm has an area of 6 acres (Fig. 276); on it the mestizo owner works and makes a living, but little more. Even with its small size the farm occupies the full width available for cultivation between the annually inundated flood plain and the valley bluff. Winter is mild at this elevation, and subtropical crops appear

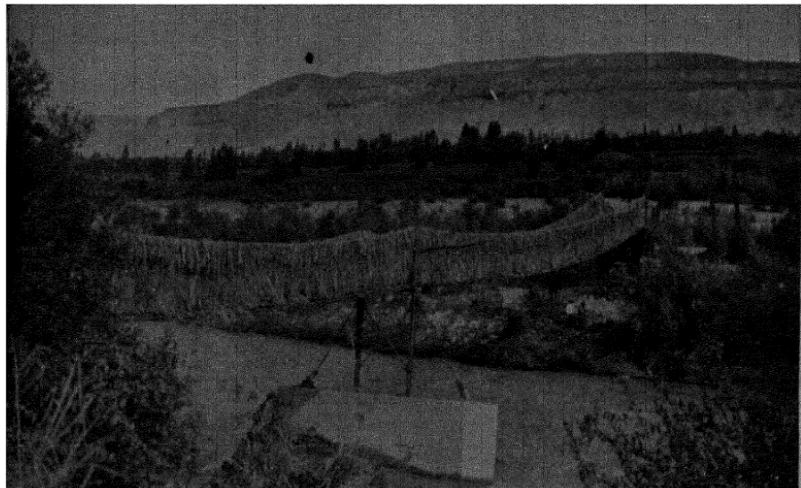


FIG. 274.—View across the Rio Vitor, bushy flood plain, and irrigated terrace fields, looking west in the Sotillo Farm area. Old-style Indian bridge, hung on the ruins of a modern steel and concrete bridge washed out by flood.



FIG. 275.—Desert plain, or pampa, above the edge of the Vitor Valley (which here lies 1,000 feet below), before reclamation by large-scale high-level irrigation.

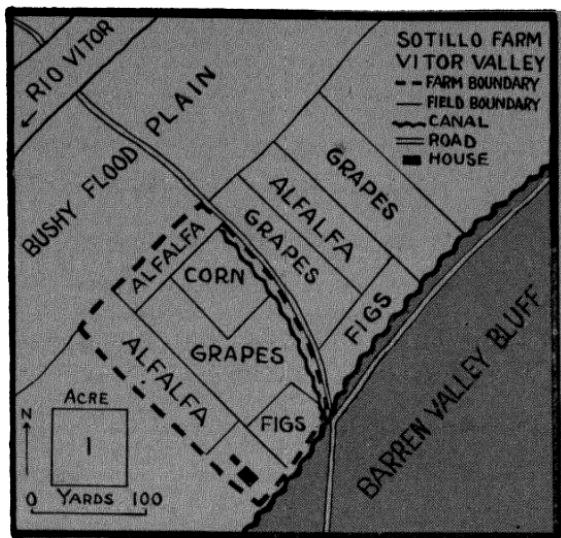


FIG. 276.—Field pattern of a small subtropical farm.

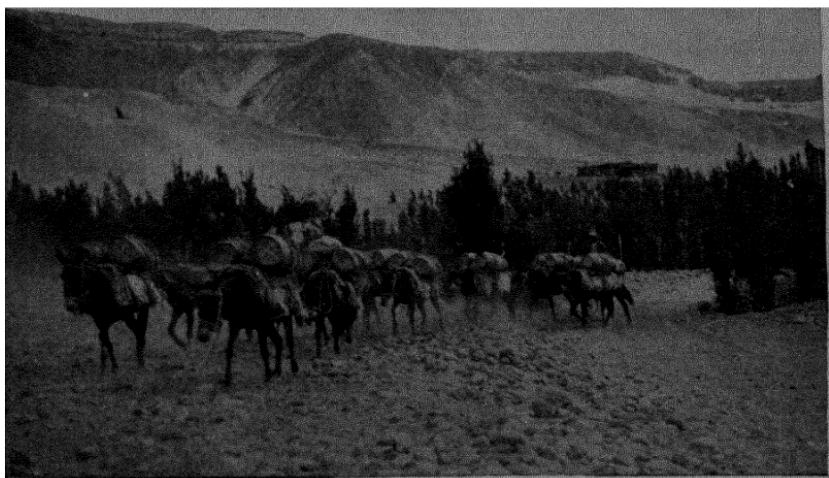


FIG. 277.—Pack train of wine starting up from the Vitor Valley toward the high highlands.

—grapes and figs, in addition to alfalfa and corn.

There is a market for the fruit and for wine in districts higher up (Fig. 277); but the small size and isolation of the community in coincidence with the

small amount of productive land does not encourage a high degree of development. Subsistence production of ordinary food crops is typical. There are larger farms than the one under discussion, but no highly organized development.

### 9. ANDABAMBA,<sup>1</sup> 6,000 FEET

#### AN OLD HACIENDA IN THE UPPER HUALLAGA VALLEY

From the high plateaus of central Peru, which are well-settled and connected by road and railway with the

elevation of 15,000 feet to Huánuco at an elevation of 6,000 feet, above the point at which the river valley

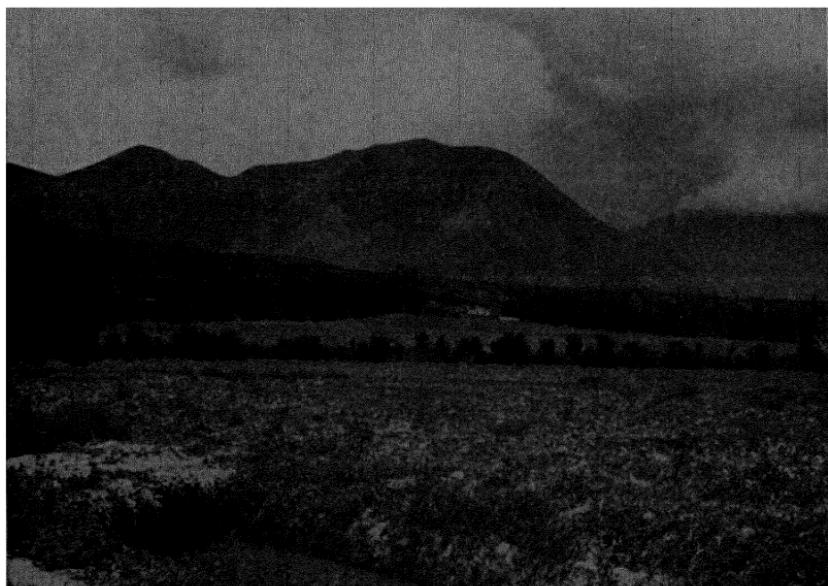


FIG. 278.—Hacienda Andabamba. *Casa grande* in the center; irrigated terrace fields of the Huallaga Valley, occupied by sugar cane, in front of the *casa grande*; temporary pasture in the foreground; fields of supply crops for the laborers on the slope at the left. View looking northwest from near the river.

western coastal lowlands, two highways have been built down the eastern slopes to the montaña, the region of equatorial rain forest.

The more northerly of these highways descends the upper valley of the Rio Huallaga within the mountain region from Cerro de Pasco at an

narrow to a gorge through the eastern ranges of the Andes [Fig. 228(9)]. Beyond Huánuco the road is being extended with difficulty into the forested mountains and lowlands and is passable only in dry weather. It is significant that as far as Huánuco the route bears characteristics of the

<sup>1</sup> Field work in January, 1936.

highland region, even though it has descended from the cold paramo through the zone of hardy crops, cereals and vegetables, to the zone of tropical agriculture. Dry bushes and grasses cover the slopes about Huá-

*grande* of the hacienda (Fig. 279) is at the upper edge of the terrace and is adjoined by orchards of oranges and avocados, a small coffee grove, and a small plantation of coca.

The sugar and fruits are produced

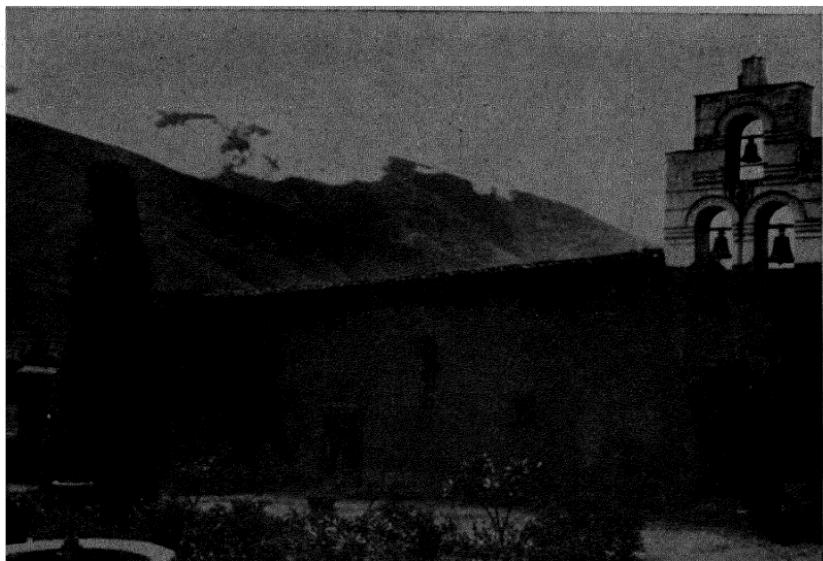


FIG. 279.—*Casa grande*, Hacienda Andabamba. Glimpse of cane fields at the left. View looking southeast, toward mountains across the Huallaga Valley. Externally the house retains the aspect of the Colonial Period, when it was built, but internally it has been refurnished in modernistic style.

nuco, and highland Indians cultivate the fertile valley lands in haciendas in which commercial farming for the landlord and subsistence farming for the laborers have their time-honored places.

**HACIENDA ANDABAMBA** is the property of a Peruvian aristocrat who has other interests and lives in Lima. The hacienda occupies a section of flood plain, terrace, alluvial fans, and mountain slopes along one side of the Huallaga (Fig. 278). The flood plain is uncultivable sand and gravel. The terrace is fertile alluvial silt and is occupied by large fields of sugar cane, irrigated by water conducted from the river in a canal along the terrace. The *casa*

for the Lima market, whither they are transported by truck. The coffee is for home supply. The coca is for experimental production here at the upper limit of growth for the coca plant. The bulk of the product is produced at lower elevations on the eastern slopes within the zone of rain forest. The dark green mature leaves are picked every 3 months and sent to the coca mill at Huánuco where they are soaked and boiled down for the extraction of cocaine, either in coarse form for the highland Indian market as a condiment or in pure form for the foreign drug market.

At Andabamba, with less heat and moisture than in the rain forest, the

coca plants are small and the leaves slow-growing, so that the harvest is too light to be profitable.

On the alluvial fans, above the irrigated cane fields and orchards of

born on the place and considered as having inherited rights to their homes and farm lands.

The bushy mountain slopes are unoccupied except to provide a little

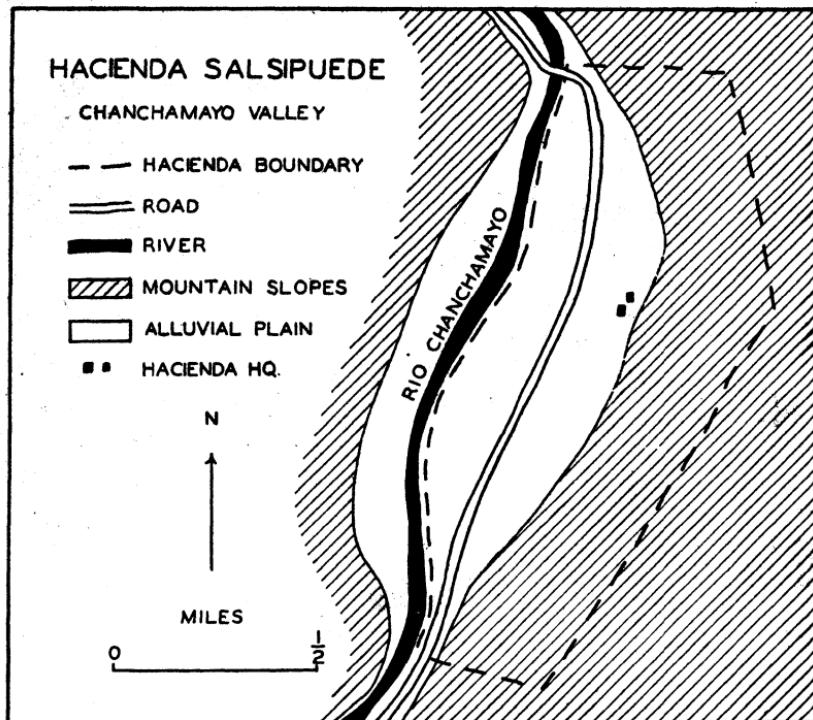


FIG. 280.—The valley site of a new plantation.

the terrace, are the unirrigated *chacras* of the laborers, 1 hectare for each man, enough to provide food for his family. Corn is the main crop here and produces a dependable annual crop. There are 220 Indian laborers living permanently on the hacienda, most of them

meager pasturage for the miscellaneous livestock of the people.

The hacienda has an area of 2,000 acres, of which 800 acres are in sugar cane and fruit, 500 are in *chacras*, 300 are cultivable lands temporarily fallow, and 400 are uncultivable mountain slopes.

#### 10. SALSIPUEDE,<sup>1</sup> 3,000 FEET

##### A NEW PLANTATION IN THE CHANCHAMAYO VALLEY

The other highway from the plateau to the montaña extends eastward from the railhead at Oroya, crosses a paramo

at 15,000 feet, and descends the Tarma Valley and farther downstream the steep and narrow Palca Valley to San

<sup>1</sup> Field work in December, 1935.

Ramón at an elevation of 3,000 feet [Fig. 228(10)]. In its descent the highway passes from open bushlands in the upper part of the Tarma Valley into dense forest growth below 7,000 feet in the Palca Valley. The highest coffee

HACIENDA SALSIPUEDE occupies a fairly wide section of the valley on the road 5 miles below San Ramón. Its western boundary is the river, its eastern is the adjacent mountain ridge, its northern and southern bound-

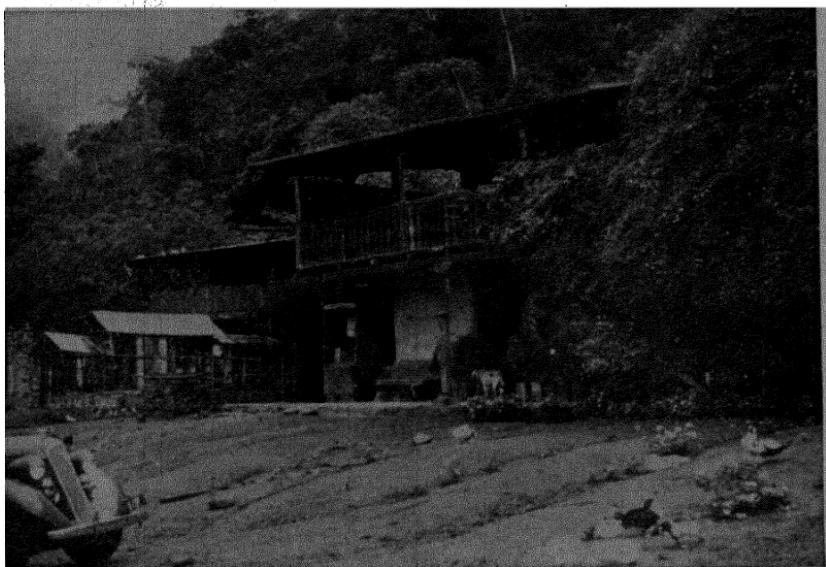


FIG. 281.—House of the German owner, Hacienda Salsipuede, at the upper margin of the alluvial plain, against a forested mountain slope. View looking northeast.

grove is at an elevation of 6,500 feet, and below this point are other items of tropical production, although the valley is too narrow and steep-sided for large plantations.

At San Ramón the Río Palca joins the Río Tulumayo to form the Río Chanchamayo and the highway continues along the Chanchamayo to the confluence of the Río Chanchamayo and the Río Paucartambo to form the Río Perené, tributary to the Tambo, tributary to the Ucayali, tributary to the Amazon.

The Chanchamayo, in contrast with the Palca, is a valley of considerable width and low gradient along much of its course, and these wider sections of the valley provide ample sites for plantations.

aries are at constrictions of the valley where water gaps mark the river's passage through minor mountain ridges (Fig. 280).

The valley site of Salsipuede is like that of Andabamba, and the form of the hacienda is similar. The valley terrace is the principal producing area of the plantation; the lower slopes of the valley side are devoted to *chacras* allotted to laborers for family supply crops; the steeper mountain slopes above on the one hand and the flood plain below on the other are unused. Coffee and tropical fruits are grown on the terrace, and corn is the main supply crop of the *chacras*.

Aside from these similarities between Salsipuede and Andabamba there are conspicuous dissimilarities. The eleva-

tion is lower, 3,000 feet instead of 6,000, and the climate is hotter and moister. The average annual rainfall is about seventy inches, and there is

developed by a German settler and his family (Fig. 281). The laborers are not indigenous occupants of the land but are also strangers: some of them are

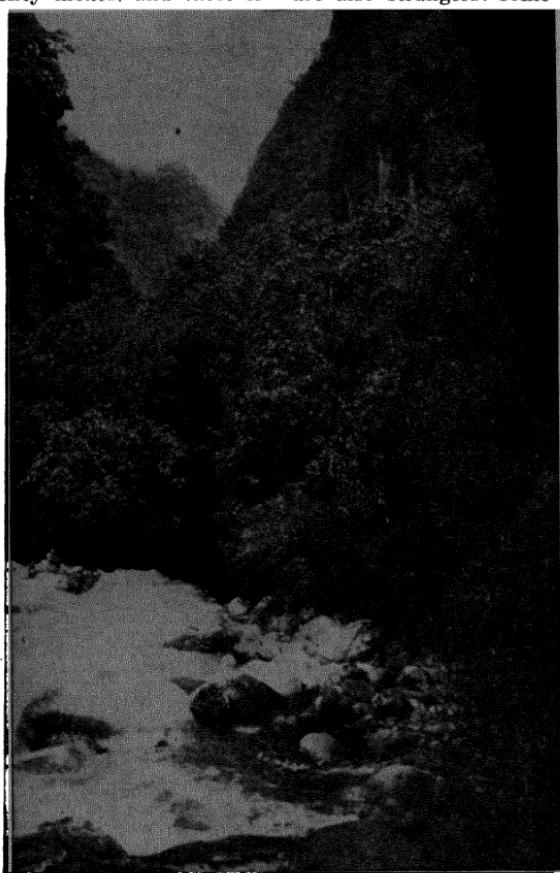


FIG. 282.—An Amazonian tributary above the head of navigation, among the forested slopes of the montaña. View looking east, downstream. Populous communities of the unforested highlands are not far distant from this point upstream to the west.

no season of drought, although one half of the year is rainier than the other half. Rain forest is the natural vegetation. Coffee is a leading commercial interest, not merely a home supply crop. Bananas as well as avocados are grown in quantity for shipment by truck to the Lima market. The place is not an ancestral Peruvian estate but a new enterprise being

highland Indians who have been coaxed by good wages to come down to the less healthful zone of the montaña; a few are lowland Indians coaxed by the "gadgets" of civilization to come out of the forest at least temporarily to work on the plantation.

Prosperity and malaria have increased in the Chanchamayo Valley.

Probably they will decrease as stability is reached, with the aging of the plantations and the adaptation of new settlers to the environment.

## 11. AGUARUNAS<sup>1</sup>

### FOREST INDIANS IN THE ANDES-AMAZON BORDERLAND

The most inaccessible parts of Peru are among the forested eastern slopes of the Andes (Fig. 282), below the settled upper valleys reached overland

tains is an area of forested valleys, swift streams, and low ranges [Fig. 228(11)]. Here are settlements of the Aguarunas, Indians of the Jivaro

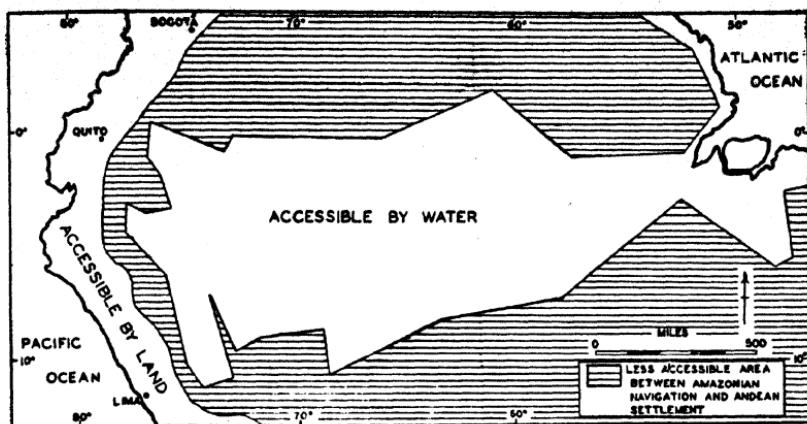


FIG. 283.—Barrier and accessible areas of the Andes and Amazon. The area "accessible by water" is defined by straight lines drawn between heads of launch navigation on the major Amazonian tributaries. The area "accessible by land" is the Pacific lowland and Andean highland regions, bounded on the east by the forested slopes of the montaña. Since pre-Columbian times, the "less accessible area" has been difficult to penetrate or cross and refractory for new occupancy. One Peruvian field study (10) illustrates penetration of the barrier zone from the west, another (11) illustrates indigenous occupancy within the barrier zone, and the rest (12 to 16) illustrate occupancy in the area "accessible by water," separated by the barrier from western Peru. (R. S. PLATT, *Conflicting Territorial Claims in the Upper Amazon*, "Geographic Aspects of International Relations, Harris Foundation Lectures 1937," University of Chicago Press, 1938.)

from the west, and above the navigable waters of the Amazon reached by boat from the east (Fig. 283). The head of navigation on the Marañon, main stream of the Amazon, is at the Pongo de Manseriche, the water gap where the river breaks through the easternmost range of the Andes (Fig. 284).

Above the Pongo within the moun-

tribe. Other Jivaros are head-hunters, but not the Aguarunas.

Near the mouth of the Nieva, a tributary of the Marañon, is the new forest clearing of an Aguaruna chief (Fig. 285). Other members of the group have similar clearings scattered along the valley, some of them widely separated and well hidden. They are

<sup>1</sup> Field work in December, 1935. R. S. PLATT, *Conflicting Territorial Claims in the Upper Amazon*, "Geographic Aspects of International Relations, Harris Foundation Lectures, 1937," pp. 270-274, University of Chicago Press, Chicago, 1938.

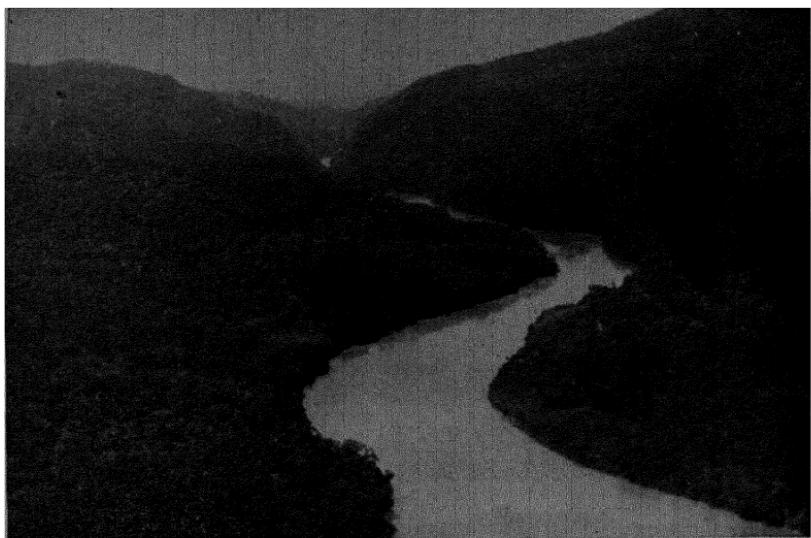


FIG. 284.—Water gap of the Rio Marañon through the easternmost range of the Andes, the head of navigation on the main stream of the Amazon, the Pongo de Manseriche. The westernmost point "accessible by water" in Fig. 283. The site of Borja, Colonial capital of the upper Amazon, on the river bank at the right. Air view from above the lowland forest, looking west upstream into the Andes.



FIG. 285.—A new clearing of Aguaruna Indians, in selva, between ranges above the Pongo de Manseriche, on upland surface near the mouth of the Rio Nieve. Riverbank at lower right. Air view looking southeast.



FIG. 286.—The clearing seen from the ground. Two new dwellings; planted cassava in the foreground. View looking southeast.



FIG. 287.—House of the *curaca*, chief of the group, a temporary but sufficient shelter. View looking northwest.



FIG. 288.—Inside of the *curaca's* house. Beds at left and right center; cupboard, peccary skins, baskets, and pottery; woman at right seated by cooking place. View looking northwest.

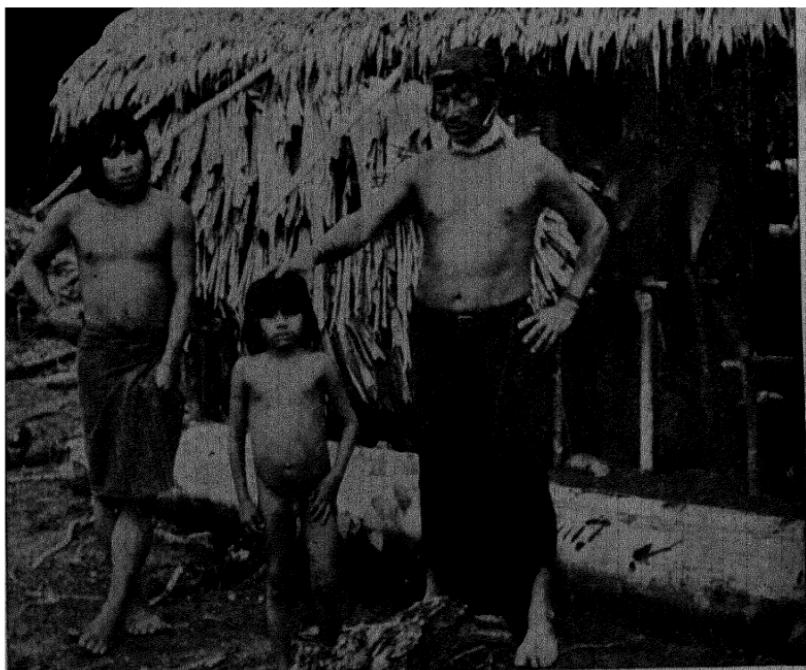


FIG. 289.—Aguaruna *curaca* and protegés. View beside the house looking northeast.

not alongside the stream in the valley but in the upland near by.

Clearing is accomplished by chopping down trees, drying, and burning. Metal axheads are the most prized

shelter but are considered temporary in the new site and may be replaced later by larger houses of the same type of construction.

The Aguarunas hunt and fish and

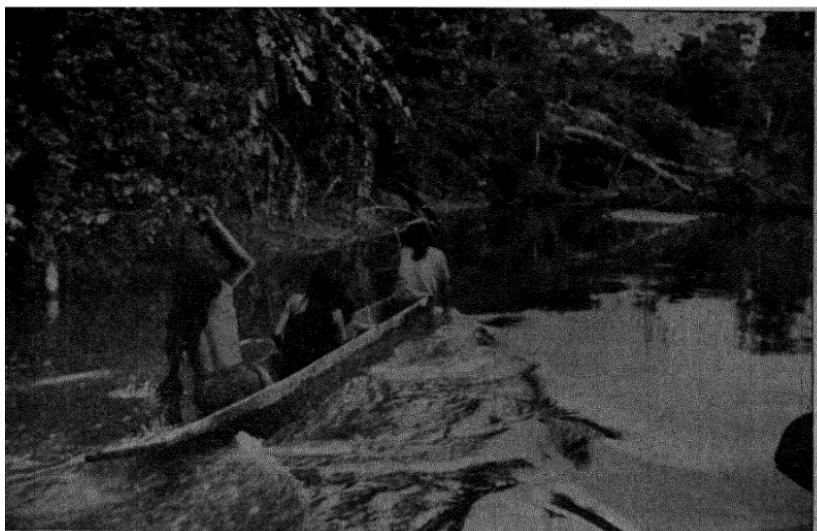


FIG. 290.—Aguaruna dugout canoe, Rio Nieva. View looking southeast along the riverbank.

possessions from the outside world. In the clearing a little subsistence agriculture is carried on, in which cassava is the chief crop (Fig. 286). The method is that of primitive shifting cropping.

There are two huts in the clearing, of light frame construction, thatched roof, open sides, and dirt floor, housing the family of the chief (Figs. 287, 288, and 289). These are adequate for

produce most of the supplies that they need and are politically independent. They are in blissful ignorance of the fact that they inhabit a zone of international tension, that their group lives astride a potential national boundary, and that some of them have been in danger of being designated as Peruvians and their brothers across the river of being designated as Ecuadorians, with a boundary between (Fig. 290).

## 12. SEPA<sup>1</sup>

### AN INDIAN COLONY IN THE UPPER AMAZON LOWLANDS

Colonia Sepa is a settlement of the Peruvian Oriente, in a concession that extends from the eastern ranges of the Andes out into the Amazon lowlands for 50 miles and embraces the whole lower course of the Rio Urubamba

from the water gap at which it leaves the mountains to its mouth, where it joins the Rio Tambo to form the Rio Ucayali [Figs. 228(12) and 291]. The area of the tract is about two thousand square miles. It lies on the Atlantic

<sup>1</sup> Field work in December, 1935.

side of the continental traffic divide, touched by the farthest extremity of Amazonian navigation and untouched by Andean land routes (Fig. 292).

A generation or two ago this head-water area was penetrated by rubber gatherers and became temporarily an

outpost of production, having numerous "caucho" rubber trees in its forests. With the collapse of the rubber boom, connections with the outside world were broken, and for years the area was left to its aboriginal inhabitants. Then a decade ago a concession was granted by the Peruvian government to a Polish syndicate for settlement of Polish immigrants. A group of technical men and artisans arrived from Poland and were conducted by a Peruvian engineer to a site chosen for the beginning of settlement, a place on the Urubamba at the mouth of the Sepa (Fig. 291).

After working for a few days to

clear the ground and erect buildings the Poles abandoned the enterprise and the group returned to Poland. But the Peruvian engineer, Sr. Urresti, was pleased with the place and acquired the concession from the Peruvian government as his own property.

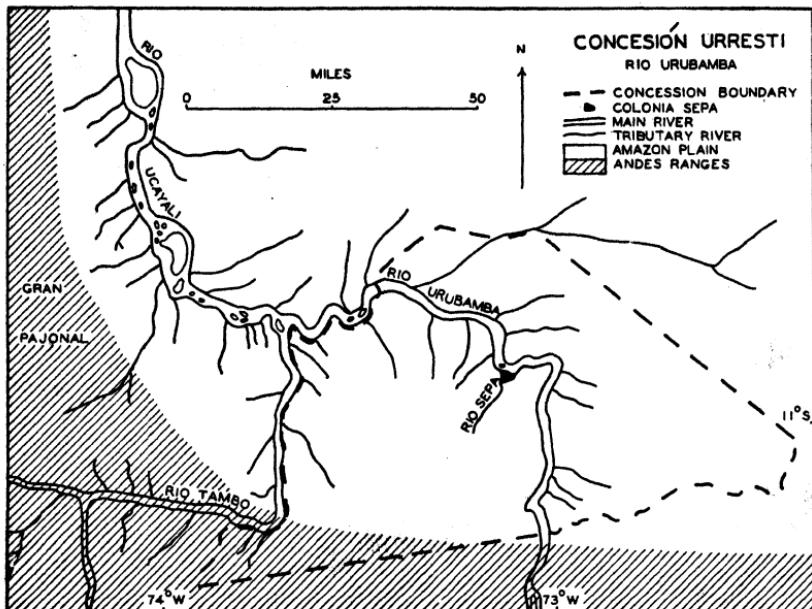


FIG. 291.—Peruvian concession for settlement in the upper Amazon east of the Andes.

outpost of production, having numerous "caucho" rubber trees in its forests. With the collapse of the rubber boom, connections with the outside world were broken, and for years the area was left to its aboriginal inhabitants. Then a decade ago a concession was granted by the Peruvian government to a Polish syndicate for settlement of Polish immigrants. A group of technical men and artisans arrived from Poland and were conducted by a Peruvian engineer to a site chosen for the beginning of settlement, a place on the Urubamba at the mouth of the Sepa (Fig. 291).

After working for a few days to

Urresti was already familiar with the region, having lived for some time among Indians farther upstream above the head of navigation and later having had a small plantation farther downstream on the Ucayali. Accordingly, he has proceeded with plans for development of Colonia Sepa, starting a plantation at the junction of the Sepa and the Urubamba, persuading a group of Piro Indians to settle on one side of the plantation upstream on the Sepa and a group of Campa Indians to settle on the other side upstream on the Urubamba (Fig. 293).

**COLONY SITE.** The place is in the rain forest of the Amazon lowlands

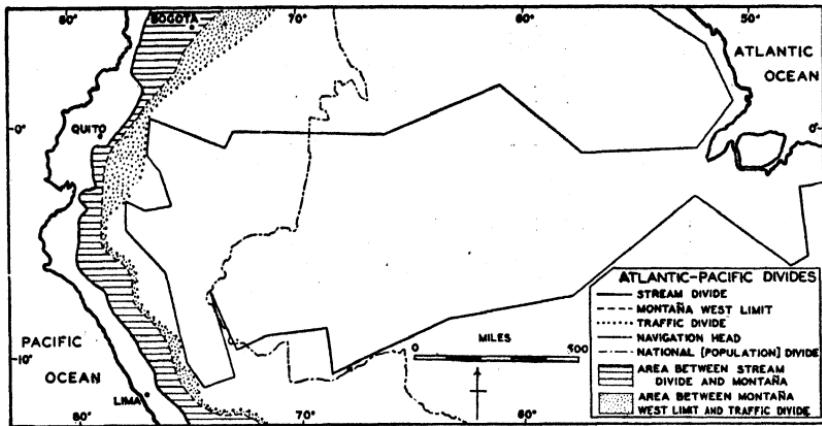


FIG. 292.—Lines of division between the Pacific and Atlantic slopes. Of the Peruvian studies, 8 is between the Pacific and the "stream divide," 6, 7, and 9 are "between stream divide and montaña," 10 "between montaña west limit and traffic divide," 11 between "traffic divide" and "navigation head," 12 to 16 between "navigation head" and "national divide," and Brazilian Amazon studies east of "national divide."

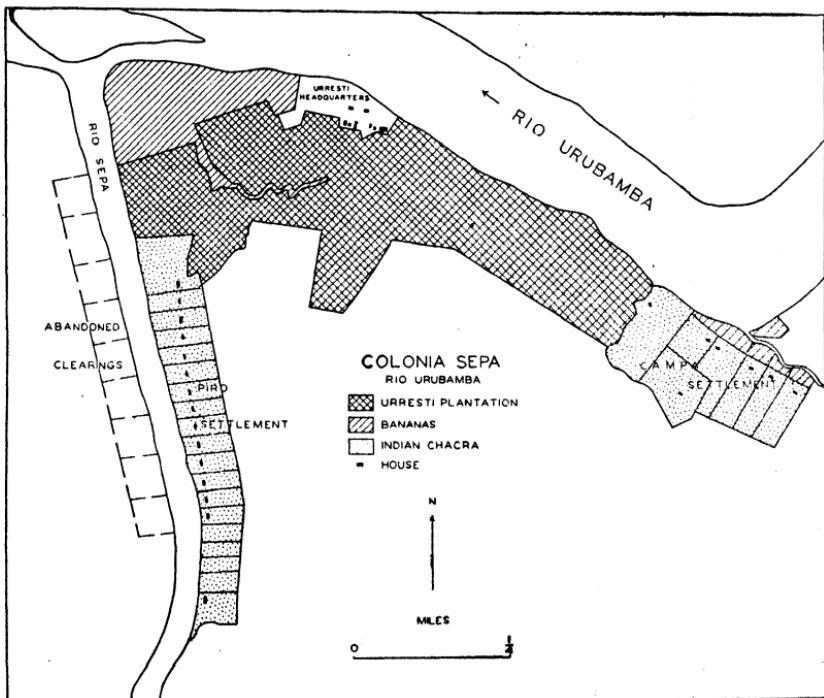


FIG. 293.—Indian settlements and plantation in the Sepa concession.

and not within sight of the Andes. There is neither cool season nor dry season. But the elevation is 1,000 feet above the sea and the river water

extends for some distance inland from the river. Of this, about 300 acres have been cleared of forest for the plantation. Coffee is planted on 220 acres.

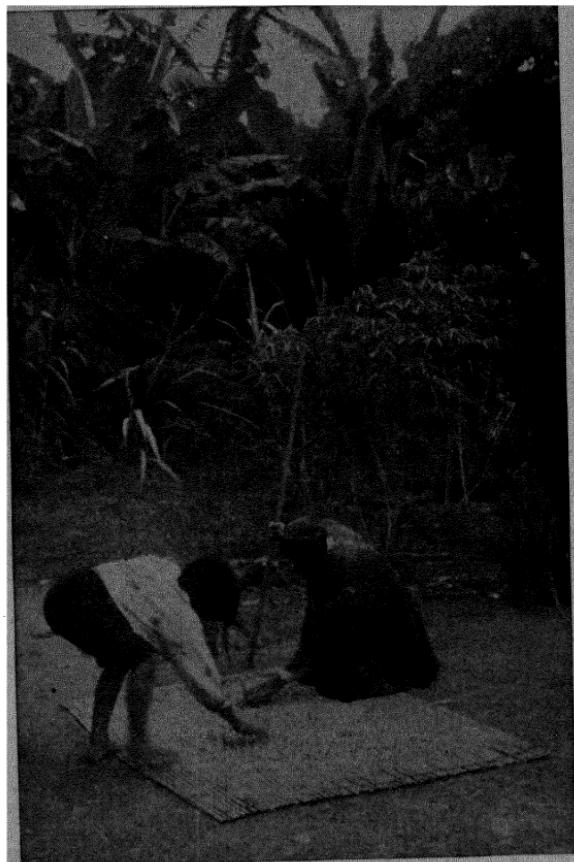


FIG. 294.—Piro Indian and wife drying coffee. Planted cassava, coffee, and plantains in the background, Rio Sepa.

fresh from the mountains is 10° cooler than that of the Amazon below the mouth of the Ucayali. In general, the climate is pleasant, healthful, and productive.

The plantation occupies a high natural levee or terrace of the Urubamba, rarely if ever flooded, on which the soil is fertile brown silt. Cultivable land

Other crops occupy the land with coffee: cacao trees serve as shade for coffee bushes in 50 acres, orange trees in 50 acres, banana plants in 75 acres, and rubber trees in a small area. Vanilla vines are trained on some of the shade trees. Field crops of shorter life occupy new clearings before the growing up of coffee. One of these is



FIG. 295.—Piro Indian cutting a picture record on deerskin, Rio Sepa.

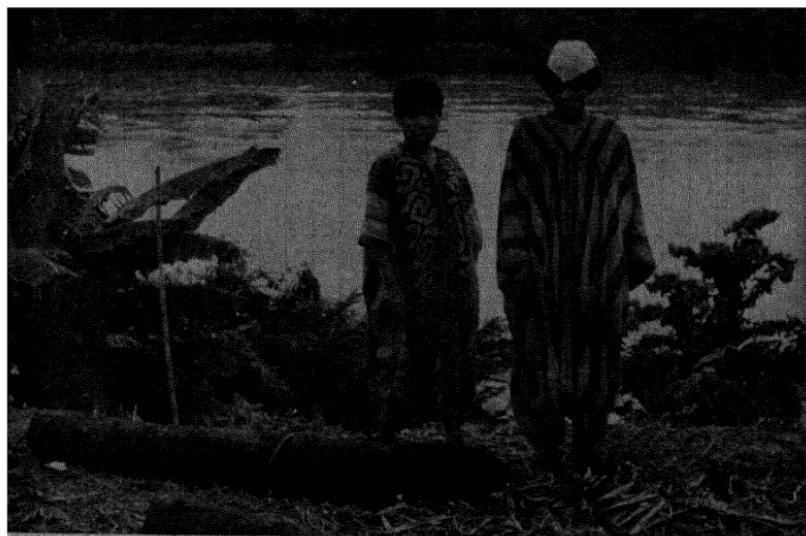


FIG. 296.—Campa Indians on the Rio Urubamba, above the Sepa mouth. View looking north across the river.

cassava in new fields of 75 acres. Others are cotton, barbasco, and upland rice.

The Indian settlements have smaller clearings: 40 acres for the 20 families of Piros along the Sepa, and 20 acres for the 10 families of Campas along the

The other products are for home use. Both the hacienda and the Indian communities are practically self-sufficient, with a variety of food in abundance, including poultry, fish, and game as well as crops, with cotton

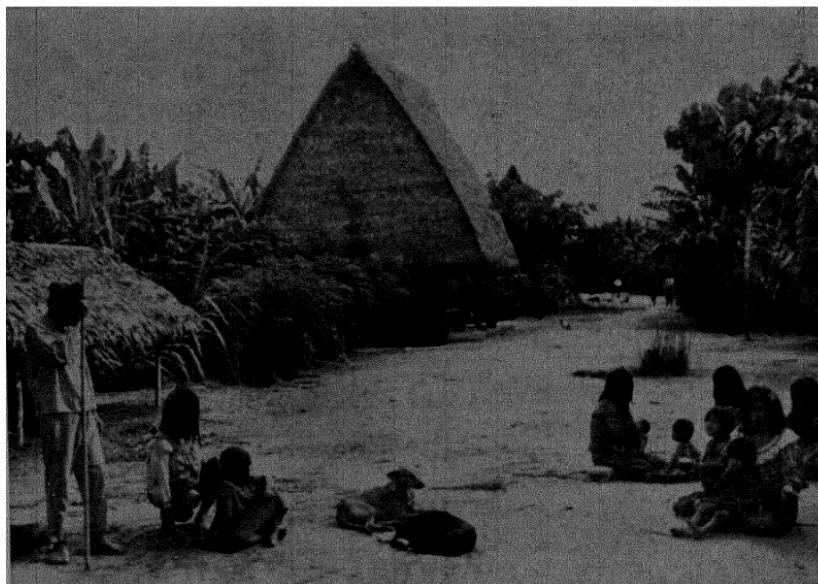


FIG. 297.—Piro Indian village street, Rio Sepa. View looking south along the riverbank. The house has a wooden platform elevated on posts for the main floor and a loft in the high gable for storage and refuge.

**Urubamba.** These are on land like that of the main plantation and have small groves of similar crops, particularly coffee, and patches of cassava, cane, and corn (Fig. 294).

**ECONOMY.** For commercial purposes, coffee is the mainstay of the *colonia*. Some of it is of high grade for the English market, and that of medium grade is also marketable. About twenty-five tons are shipped annually to Iquitos by a launch that comes up the river to the *colonia* twice a year. Barbasco and surplus cotton also are sent downstream to Iquitos. An additional item of export is furnished by the skins of peccaries shot by the Indians with bow and arrow.

for the making of clothing, and wood and thatch for buildings, furniture, and tools. Pottery also is made by Indian specialists. Mechanization is slight: there are no draft animals and no motors or engines. No money is used or needed. The coffee of the Indians is handled with that of the plantation and credited to the producers. Hardware and some cloth are the only regular imports.

Both for Indians and plantation owner, life is simple but satisfactory and not too hard. The owner's knowledge of plantation requirements and the Indians' knowledge of forest life and technical skill in providing for all needs are factors tending toward a

suitable adjustment in a productive environment. The Indians are in touch with civilization through the landowner but still retain their distinctive tribal culture (Figs. 295 and 296). They assimilate the ideas and commodities of civilization into their culture, but as a group they are not assimilated into the Peruvian nation.

Presumably, contacts of a similar sort have taken place in the past. Probably the frilly shirtwaists of the women, so different from their other

plain garments, are a European touch from the style of a past era, introduced here by missionaries of the past in an effort to cover nakedness and now persisting as an item of Indian culture but constituting no link with the modern world in respect to either fashion or religion (Fig. 297). Perhaps Urresti and his plantation will disappear and leave the Indians to themselves, as have missionaries and rubber traders; or perhaps this new contact with civilization may endure and increase.

### 13. NANAY AND ITAYA<sup>1</sup>

#### a. FREITAS RUBBER CONCESSIONS

The Rio Nanay is a small northwest-ern tributary of the Amazon rising in

fied as rubber concessions of the Freitas family. Along these 40 miles

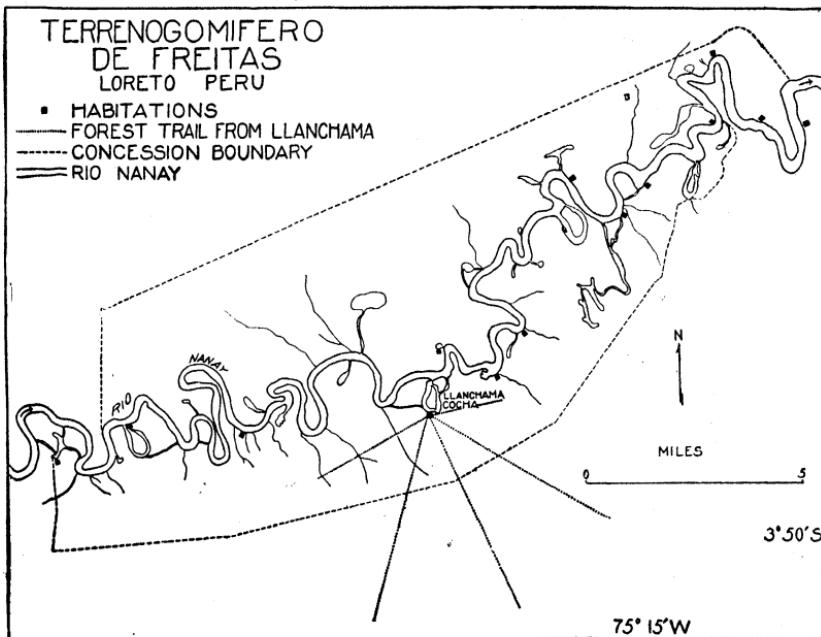


FIG. 298.—Rubber concession on the Rio Nanay.

the forested lowland near the boundary of Ecuador and Peru [Fig. 228(13)]. In its middle course is a section identi-

of waterway, a distance commonly described as 32 turns of the river, there are 15 inhabited spots, each a forest

<sup>1</sup> Field work in December, 1935.

clearing with one or more huts in a well-chosen and relatively permanent site (Fig. 298). Present habitations coincide in most cases with former rubber camps. Apparently no old sites have been abandoned and no new

of the resistance of the more compact materials. So far as known, there is only one inhabited site without a water front accessible by canoe, and this is on the edge of the upland near a flood-plain brook.



FIG. 299.—Cocama Indians of the Rio Nanay tapping a tree for *leche caspi* ("tree milk"), a gum exported as a substitute for chicle and used locally for putty. Tapping the standing tree thus yields very little gum though weakening the tree.

ones occupied for many years. This reflects the fact that good habitable sites are few and enduring. There is avoidance not only of low shores subject to flooding, submerged forest areas, but also of high natural levees subject to rapid erosion, unstable shores undercut by the current. Some habitations are on natural levees at points where the current is going offshore and neither eroding nor depositing. More of the habitations are on the upland at points where the river impinges on the side of its valley. Here erosion appears to be active but is in fact relatively slow on account

No group of huts is large enough to be called a village. A typical example is at Llanchama Cocha, where an oxbow lake touches the upland on the south side of the valley (Fig. 298). From this point of vantage the inhabitants look out over the lake and forest of the flood plain northward toward a distant channel connecting the lake with the river. This is the home of four brothers and their families, Cocama Indians, people of the forest and the river, independent but in touch with Amazonian civilization. They build canoes in the flood-

plain forest on the shore of the lake, dugouts with raised gunwales made of well-selected wood. They fish with hand line or spear in the lake and in the river. But they are too far upstream from Iquitos to trade in local supply

(Fig. 298). Hunting provides not only part of their food but also skins with which they can trade. Skins of the peccary (wild pig) are of first importance. These are sent by canoe to a Chinese merchant at Iquitos to join



FIG. 300.—Cocama Indian tapping a *leche caspi* tree after felling, Rio Nanay selva. In the case of *leche caspi* (though not in the case of hevea rubber, which yields well from standing trees), felling is more efficient for immediate production and possibly no worse for long-term production than other available methods.

products such as fish. They engage in fishing only occasionally to supply some of the food for their own subsistence and depend on other resources for part of their subsistence and for trade.

More of their time is spent in the upland forest, which bounds their clearing on three sides. There they hunt, going out along one or another of the trails that penetrate the forest

piles and bundles of skins to be shipped to North America for pigskin leather.

For hunting birds, some Indians in the vicinity use a blow gun shooting darts tipped with curare poison. But the brothers at Llanchama Cocha have a muzzle-loading shotgun with which they do their hunting. Animals on the ground can be seen and shot at a distance of about thirty yards, sug-

gesting that the undergrowth is not very dense in this well-developed rain forest.

Forest gums provide another article of trade—a dominant interest in the active days of rubber gathering, a minor interest now. The forest contains several kinds of trees yielding gums. Of these the best marketable product recently has been *leche caspi*, exported to North America as a substitute for chicle in chewing gum.

If the *leche caspi* tree is tapped while standing, a very small yield is obtained with a great deal of trouble (Fig. 299), unlike the *hevea* rubber tree from which an abundant yield is obtained during an extended period of tapping. Therefore, the *leche caspi* tree is felled before tapping (Fig. 300), the crop being thus harvested all at once and the question of future supply left to be answered by new growth over extensive areas.

#### b. TAGUA NUT GROVES

Terrenos Buena Fe y Santa Barbara form a property of about seven square miles on the Rio Itaya 20 miles up-

during floods of exceptional height, water has been known to flow across from one river to the other. Thus the

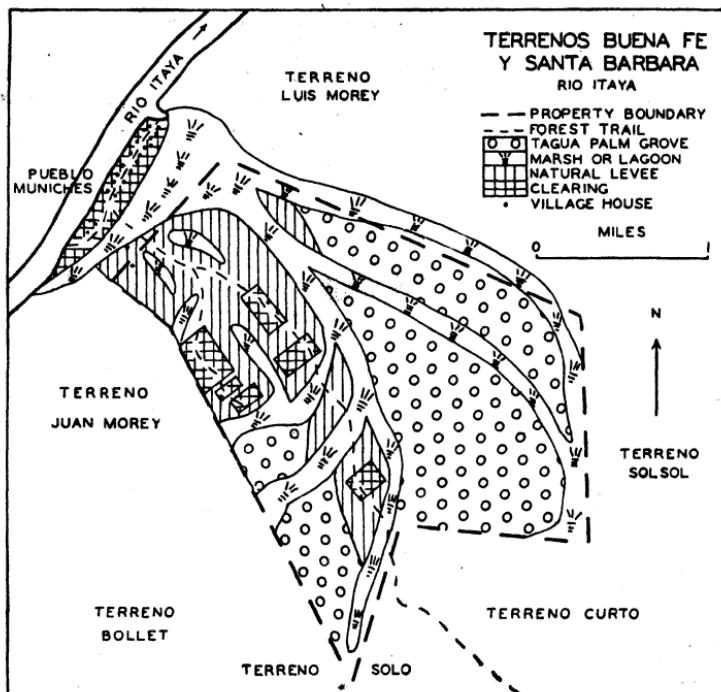


FIG. 301.—Land use in a forest concession of the Rio Itaya.

stream from the mouth of the river (Fig. 301). The Itaya here parallels the Amazon, and the distance between the two rivers is only about ten miles, with no high land intervening so that,

Itaya is here essentially within the flood plain of the Amazon.

Buena Fe y Santa Barbara and probably other properties fronting on the Itaya extend inland from the river

about half the distance to the Amazon and there touch the interior ends of properties extending inland similarly from the Amazon.

mediate areas of poor drainage. A characteristic mixture of equatorial flood-plain forest covers the area. With rainfall in every season and

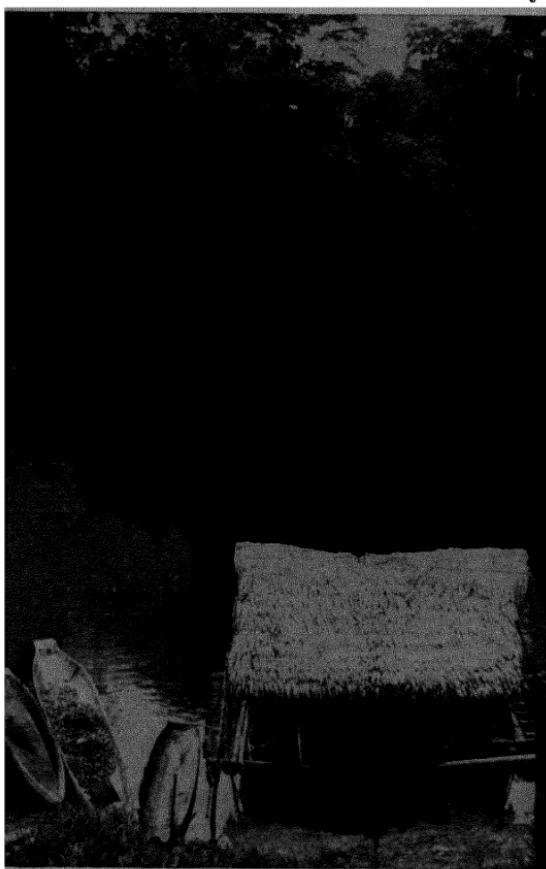


FIG. 302.—The landing place at Pueblo Muniches. Dugout canoe partly loaded with tagua (vegetable ivory) nuts. Flood-plain forest on opposite bank. View looking west across the Rio Itaya.

A village, Pueblo Muniches, occupies a section of natural levee on the Itaya and the property of Buena Fe y Santa Barbara is practically the interior hinterland of the settlement (Fig. 301). The land is of a typical flood-plain type, containing a complex of marshy abandoned channels, well-drained natural levees, and inter-

constant heat, excess of moisture is the chief deterrent to forest development. Open areas of marsh growth appear in the abandoned channels, and the best developed forest of diversified large trees appears on the natural levees. Some areas on the levees have been cleared for cultivation. These are the subsistence farms of village people,

in which cassava, corn, cane, and bananas are produced for home supply. The users of these *chacras* pay a small monthly rent to the landowner.

But for the owner the most important parts of the property are the intermediate poorly drained areas, in which there is neither marsh growth nor mixed forest but natural groves of tagua (ivory nut) palms in almost pure stands (Fig. 301). These small short-lived trees bear nuts in large and numerous bunches. At all seasons of the year but particularly during the rainiest period (February, March, and April), nuts mature and fall to the ground. The outer covering decays, but the kernel is durable and inedible and can remain on the ground without deterioration for a time until gathered by men who periodically work through the groves. Four or five men are employed for this purpose. They collect the nuts in baskets and carry them to the village where they are loaded in bulk into dugout canoes, each having a capacity of about a ton, for shipment down the river to

Iquitos at the mouth of the Itaya (Fig. 302). There the consignment of raw vegetable ivory is taken by a trader and exported down the Amazon and across to Europe for manufacture into buttons and other small articles. The annual crop at Buena Fe y Santa Barbara is about one hundred tons.

The owner of the property is a Peruvian who lives in Iquitos. He has other interests, and his income from this property is not very large. People roam through the forest freely, and wild nuts gathered so easily are hardly considered to be private property. Therefore, a considerable part of the crop does not accrue to the owner.

The people of Pueblo Muniches are Indians who support themselves by fishing, hunting, and shifting cultivation and sometimes gathering forest products to exchange for supplies. They are typical of those Indians whose habitat is along navigable streams and who therefore have lived for several generations in contact with the exotic civilization of Amazonian traders.

#### 14. BOCA HUALLAGA<sup>1</sup>

##### AN UPRIVER TRADING POST

On the Rio Marañon the Milho Trading Post is the farthest place upstream having a store where goods are bought and sold [Fig. 288(14)]. The post is on a flood-plain point at the mouth of the Huallaga. The higher and older flood-plain land is densely forested, but the low point of recent deposition between the rivers is open grassland, under water for about six months every year (Fig. 303). The buildings are on piles high enough to raise the floors above flood levels. During the flood season, outdoor movement is all by boat, and domestic animals are brought indoors or transferred to distant pastures.

The trading room has the aspect of a small rural general store with a simple and elementary stock of dry goods, hardware, drugs, groceries, and trinkets on half a dozen shelves. In addition to these imported staples, there are a few exports taken in trade from Indians: skins, gums, and bits of handiwork.

As the store farthest upstream on the Marañon, Milho is visited by Indians coming from upriver a distance of more than a hundred miles, from primitive communities having only slight and infrequent contacts with commercial civilization. Buttons are a popular item of stock bought by

<sup>1</sup> Field work in December, 1935.

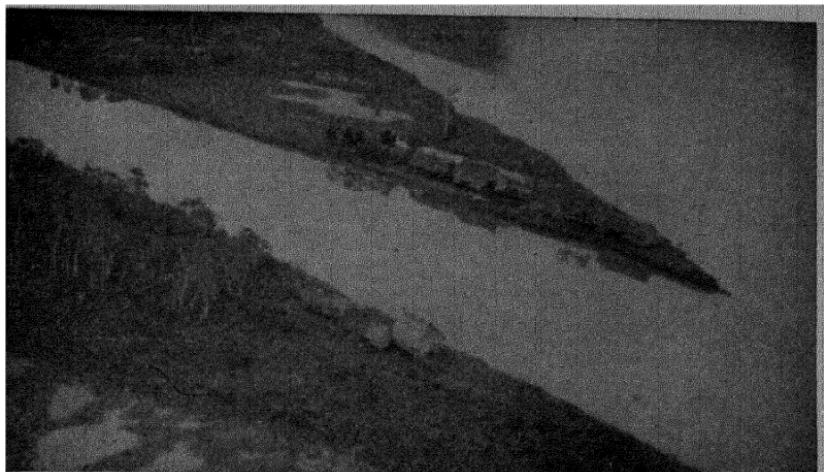


FIG. 303.—The trading post at the mouth of the Rio Huallaga, on a flood-plain point. Rio Marañon at right, a channel of the Rio Huallaga at left. Air view looking northwest



FIG. 304.—The trader's family, Boca Huallaga. Cow and Indian boy at right; a channel of the Rio Huallaga in the background. View looking southwest, upstream.

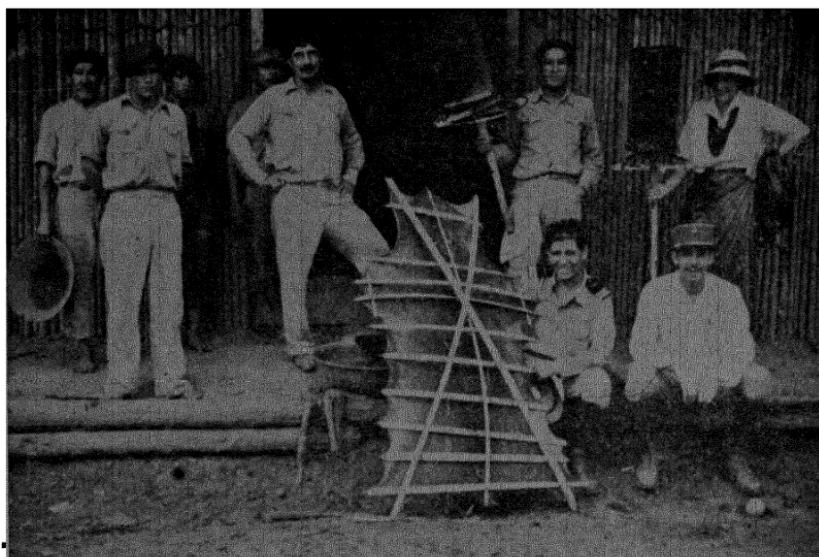


FIG. 305.—A privy pose at La Estrella, on the Rio Marañon, 60 miles above Huallaga, 60 miles below the Pongo de Manseriche. A producing point of products to be shipped downstream. The trader in left center, and his working force. Lieutenant commanding the Peruvian army outpost of the district seated at lower right. Peruvian army pilot seated, right center, and his mechanic standing behind him. Peccary skin on drying frame, new rubber bags on frames, metal pans for washing placer gold.

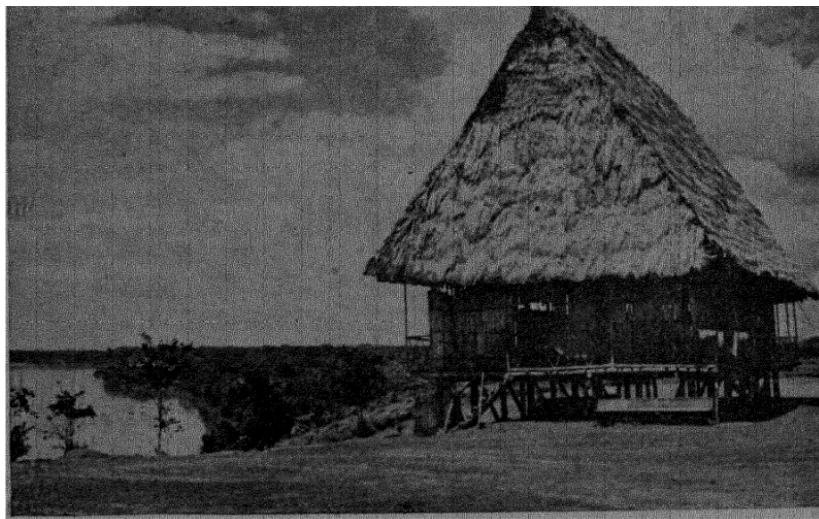


FIG. 306.—Main barrack building of Barranca, upriver Peruvian army outpost, on upland plain overlooking Rio Marañon, near La Estrella trading post. View looking west, upstream.

Indians who have no buttoned clothing but who make bead necklaces of buttons as a new style of ornament.

Although the Marañon is considered the main river, it is for traffic a cul-de-sac leading only to headwater Indian country. But the smaller Huallaga is the main route to Peruvian settlements in the Eastern Andes and has not merely a trading post but a flourishing

Peru. His wife is a Chilean whose father migrated when she was a little girl north along the Pacific coast to Peru, over the Andes to the Ucayali Valley, and downstream to where she met her husband on his way upstream.

Here, 3,000 miles upstream from the Atlantic, these innate pioneers have made a home. The site would not be considered a favorable one: on flood-



FIG. 307.—Iquitos, the commercial and political capital of the region, usual head of navigation for ocean-going ships, 200 miles below Boca Huallaga. View looking west, inland, from a building on the water front, over the forested plain. The plaza in right center.

town, Yurimaguas, near its head of navigation. Therefore, the Milho Trading Post at the river mouth does not have customers coming to it as a trading center from far up the Huallaga. But the post is a convenient port of call for launches on the route between Iquitos and Yurimaguas and profits by this contact.

The trader, Sr. Milho, is a Portuguese who migrated to Brazil and up the Amazon many years ago, finally crossing the western boundary of Brazil and establishing himself in

plain marsh in the heart of equatorial rain forest with the extreme climate, the mud and water, the insect pests, and the reptiles and savages for which the Amazon jungles are notorious. Yet the home is neat and well-kept, the food nutritious and well-prepared, including fresh milk from contented cows. The wild animals and savages are relatively harmless. The children are clean, healthy, well-behaved, and well-tutored by their mother (Fig. 304). They do not seem to lack opportunity for a good life.

In its functions the Milho Trading Post holds an intermediate place between, on the one hand, points such as Llanchama Cocha and other upriver

outposts collecting produce directly from the forest (Figs. 305 and 306) and, on the other hand, the city of Iquitos, trade center of the region (Fig. 307).

## 15. PAYAROTE AND CAHUIDE<sup>1</sup>

### a. FLOOD-PLAIN PLANTATION

Payarote is at the confluence of the Rio Ucayali and the Rio Marañon, where nominally (in Peruvian parlance)

Amazon. The only developed spot in the area is an irregular group of clearings totaling less than one square mile

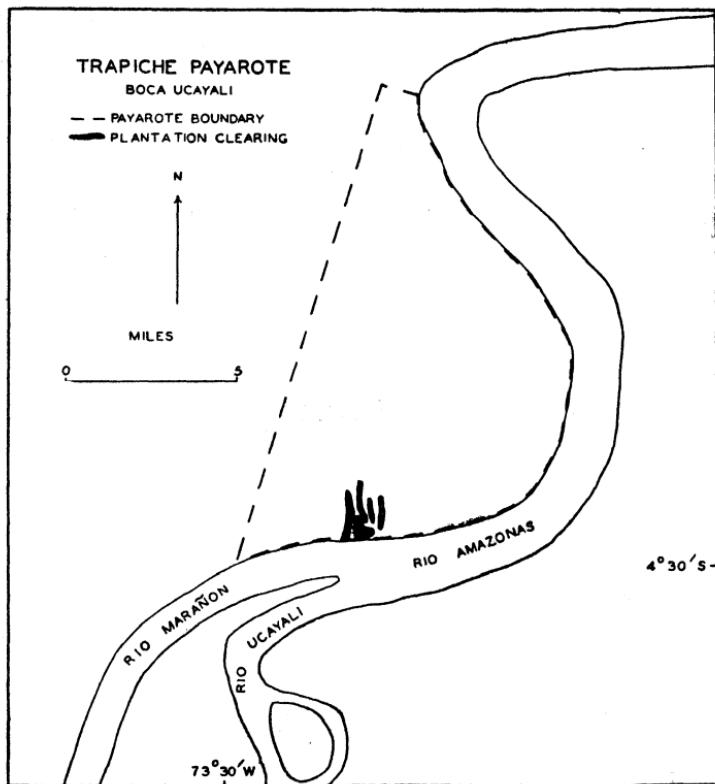


FIG. 308.—Payarote property and its plantation at the confluence of Rio Marañon and Rio Ucayali.

the Amazon begins [Fig. 228(15)]. The whole property has an area of about seventy-five square miles of lowland plain within a great bend of the

on the north bank opposite the mouth of the Ucayali (Fig. 308).

The cleared area is in the flood plain, which has a typical pattern of

<sup>1</sup> Field work in December, 1935.



FIG. 309.—Payarote plantation. Sugar cane on natural levees, flood plain forest on poorly drained land between. Rio Marañon cutting across the levees, on the skyline of the picture. Cane mill and distillery, and owner's house, in upper left center. Air view looking south.



FIG. 310.—Porch of the owner's house, Payarote. Baby's hammock and Indian nurse. Pasture land below; Rio Marañon across the background. View looking south.

flood-plain forms—natural levees and lagoons. The clearings are in narrow parallel strips extending inland from the river bank, occupying natural levees, which in this place happen to be at right angles to the present course of the river (Fig. 309). These are separated by intervening depressions filled with wet flood-plain forest and marsh.

Some of the clearings are used as pasture land for cattle, but the primary interest is sugar cane. A hundred acres are in cane, and the central establishment is a *trapiche* in which cane is milled and *aguardiente* is made. Four cart roads focus on the mill. At harvest-time the cane is cut, stripped, and carried by workers to the nearest road whence it is hauled in oxcarts to the mill. The harvest season is concentrated because the season of growth is confined to 10 months by floodwaters, which cover the area for 2 months

annually. Replanting is necessary every year when the water recedes.

The owner's house is built on piles above the reach of the flood (Fig. 310). The owner and his family are Peruvians who visit frequently in Iquitos but who live regularly at the plantation. The manager of the *trapiche* is a Peruvian who comes from Iquitos for the season. There are about 50 laborers, most of them Indians, who live along the riverbank and come by canoe to work at the plantation.

The product of the plantation, *aguardiente*, is sold downstream at Iquitos and upstream at settlements along the Ucayali and the Marañon. Distribution is not a problem in view of the strategic position of the *trapiche* as a port of call for launches from Iquitos on either of the great upriver routes. If the site were not flood plain, it might have been selected for a city instead of a plantation.

#### b. UPLAND PLANTATION

Near Quista Cocha, a small lake between the Rio Itaya and the Rio Nanay, are some landholdings that recently have been made accessible by a road from Iquitos, 20 miles to the northeast [Fig. 228(15)]. One of these landholdings is the Fundo Cahuide, belonging to a Peruvian businessman who lives in Iquitos (Fig. 311).

For a long time there has been a small settlement of Cocama Indians on the property, who support themselves from the forest and from subsistence farm clearings, and who are hardly in touch with the outside world (Fig. 312). Now that the place is accessible by road, the landowner has undertaken some commercial development, with the cooperation of the Indians.

The land is undulating upland with deep friable reddish-brown soil, 50 feet above the flood plains of the near-by rivers. It is within a strip of upland forming the divide between the Itaya

and the Nanay valleys and extending all the way to the Amazon, where Iquitos occupies the upland bluff overlooking the river.

The natural vegetation is luxuriant rain forest of a great variety of large trees, green throughout the year, having little undergrowth under the shade of the forest canopy (Fig. 313). The annual rainfall is about a hundred inches; although there is more at one season than at another, there is no season of drought. The average temperature of every month is about 80°F.

Of the 320 acres in the property, 270 remain forested, and 50 have been cleared. Of the cleared land a little more than half is in pasture and supply crops. The remainder is occupied by commercial plantation crops—coffee and barbasco (Fig. 311). Coffee does not seem to be an appropriate crop for the rain forest at an altitude of less than 1,000 feet above the sea, but it is a success. The coffee bushes bear well,

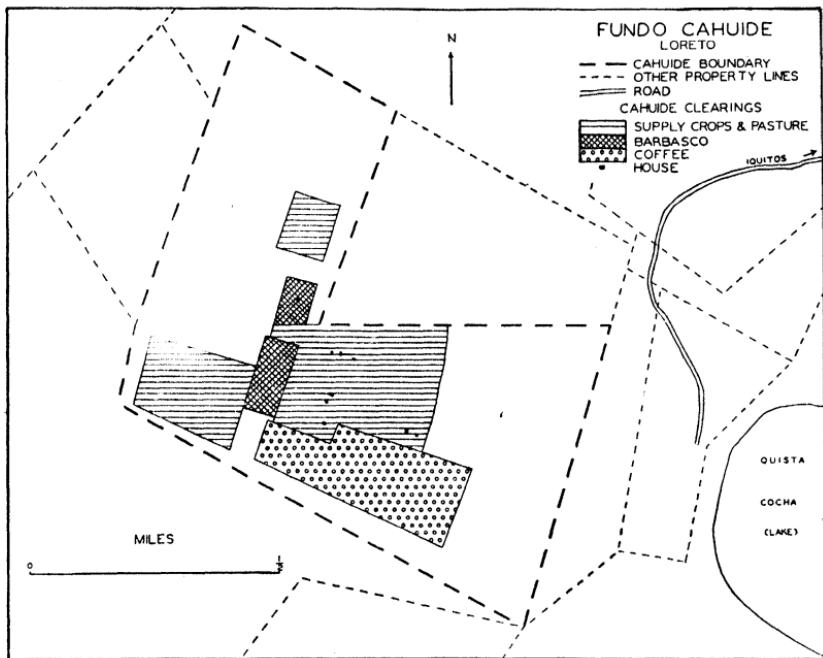


FIG. 311.—Cahuide, upland forest property between Rio Nanay and Rio Itaya. Unshaded areas in Cahuide and most of the land in adjacent properties are occupied by forest.

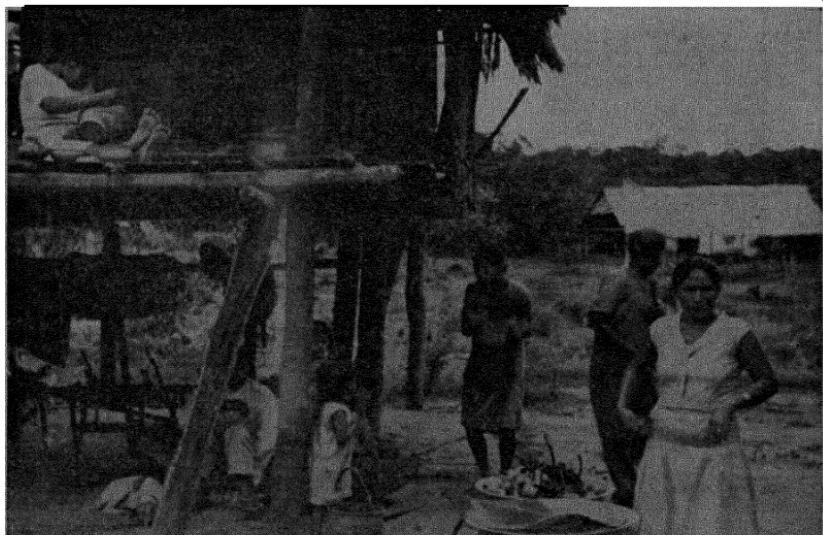


FIG. 312.—Cocama Indian community on the Cahuide property. Kitchen below; the pottery maker of the community (a young woman taught by her grandmother) in upper left.

and the product, classified as of good grade, is marketed advantageously in Iquitos.

This seems to illustrate certain points about such an industry: (1) that good coffee depends more upon

established market than it is to sell a more typical equatorial lowland product, such as cacao, for which there is not an established market.

The other plantation crop, barbasco, has long been familiar to the Indians.

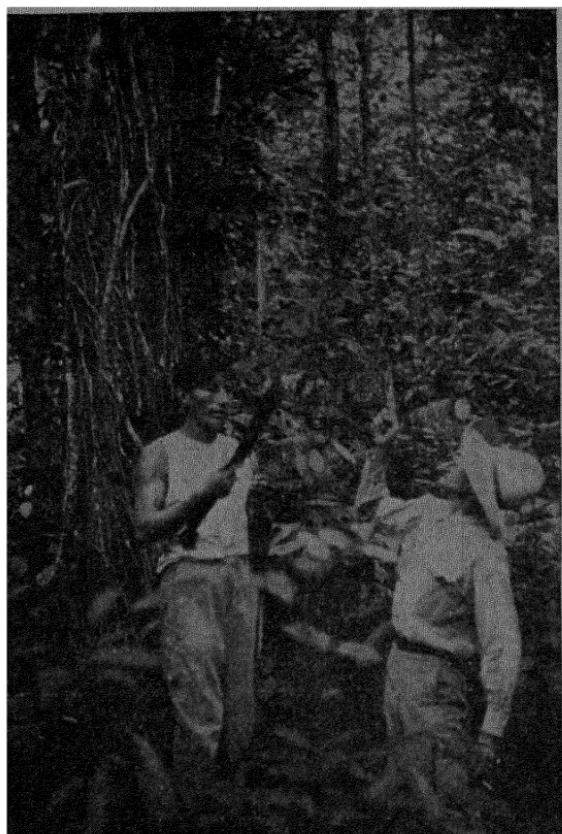


FIG. 313.—Peruvian owner and Indian woodsman in the forest, Cabuide. A dense mixed stand of tall trees giving shade above and relatively light undergrowth below, typical of selva.

careful methods of production than upon finely distinguished climatic characteristics; (2) that success depends upon an established market. Iquitos is the market for coffee brought downstream from well-developed districts on the eastern slopes of the Andes, and it is easier to contribute coffee to this

The root contains a poison used locally for fishing purposes. The liquid expressed from the root is thrown into ponds or quiet stream waters to stun the fish and cause them to rise to the surface where they can be taken from the water by hand or dip net.

The poison is harmless to human beings but has been found effective as an insecticide. Therefore, a demand for the product has developed in the United States for use as a spray on fruit trees. Instead of the small patches

of prices. Probably equilibrium will be reached, and barbasco will continue to have a place as one of the commercial crops of Fundo Cahuide.

Meanwhile the Indians continue to support themselves with their own

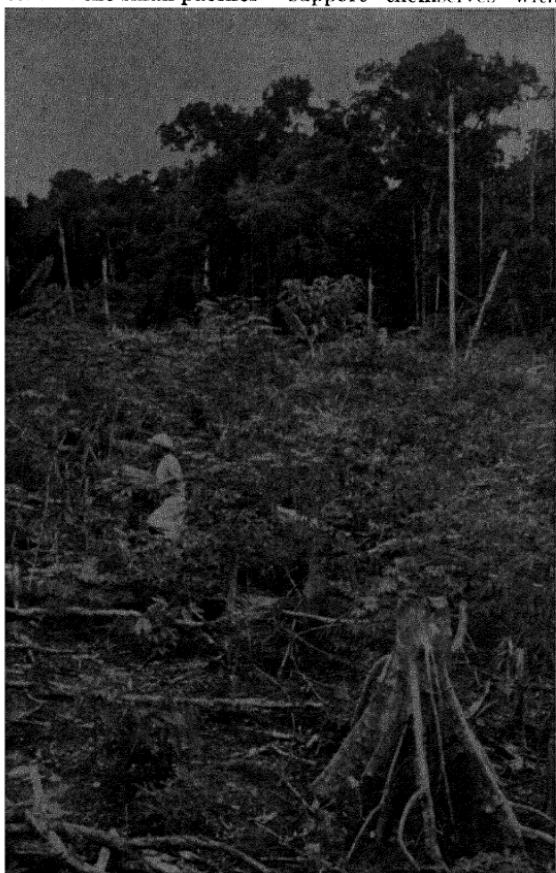


FIG. 314.—Plantation of Cahuide, after felling of forest, ground occupied by cassava, commercial crop of barbasco starting to grow.

of barbasco kept by the Indians, there are now plantation fields (Fig. 314). The crop grows to maturity in  $1\frac{1}{2}$  years, and the yield per acre is high. The first demand raised the price to boom proportions, followed by widespread planting throughout the Iquitos region, followed in turn by a collapse

crops and household livestock, supplying most of their needs for food, shelter, and utensils of wood and clay, accepting the opportunity to earn wages in the coffee and barbasco plantation and to buy cloth and other trade goods on occasional expeditions to the city of Iquitos.

16. CHIMBOLE<sup>1</sup>

## AN AMAZON FRONTIER TRADING POST

Chimbote is in the eastern boundary zone of Peru, near the frontiers of Colombia and Brazil [Figs. 228(16) and 315]. Along the river front of the post the Amazon is bordered by flood

The trader is a Peruvian from the Pacific coast. His laborers speak no Spanish and are not considered Peruvians. They are Yagua Indians, whose territory extends along both sides of

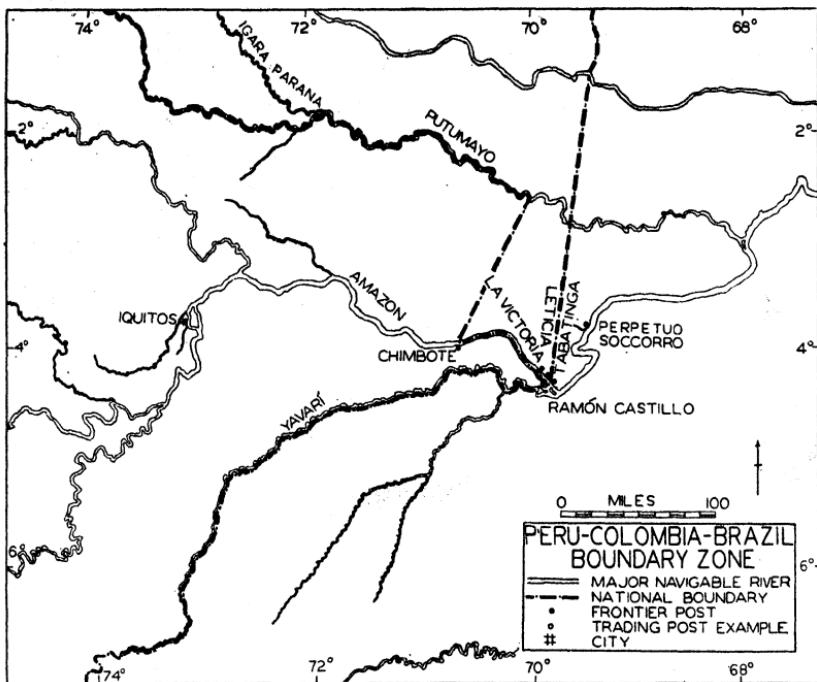


FIG. 315.—Location of Chimbote, Peru, and of two other study sites: La Victoria, Colombia [Fig. 168(11)] and Perpetuo Socorro, Brazil [Fig. 402(18)]. The national boundaries are between Brazil on the east side of the map, Peru on the west, and Colombia on the north.

plain, but there is a high natural levee very rarely flooded and behind this the edge of the upland plain within a quarter mile of the river (Fig. 316). The trader's house occupies a site on the upland slope and is separated from the river only by the narrow flood-plain clearing.

the river and is crossed by the international boundary between Peru and Colombia, of which the Yaguas are not yet conscious (Fig. 317).

Activities of the post are not far-flung. The trader has no launch and is interested primarily in resources close at hand, particularly in produc-

<sup>1</sup> Field work in November, 1935. R. S. PLATT, Conflicting Territorial Claims in the Upper Amazon, "Geographic Aspects of International Relations, Harris Foundation Lectures 1937," pp. 251, 252, University of Chicago Press, Chicago, 1938.



FIG. 316.—Water front of Chimbote seen from a river steamboat. Cordwood for steamboat fuel in foreground; pile of forest products behind the wood; Yagua Indian forest workers to load wood; cotton and banana plantation on the natural levee; rice and corn farther back; buildings of the post; forest on the upland plain.



FIG. 317.—Chimbote landing place. Yagua Indian forest workers; cargo of forest gums, peccary skins, and cotton for export. River boat alongside. View looking northwest, the opposite bank of the Amazon in the background.

tion from his own land. He has title from the Peruvian government to a tract of 4 square miles with a frontage of 3 miles on the river. The soil of the upland plain is moderately fertile and that of the flood plain very fertile. Agriculture is considered as a possibility not merely for subsistence but also for commercial production. Between the riverbank and the trader's house at the foot of the upland is a clearing of 10 acres. The natural levee along the river is occupied by bananas, cassava, and cotton (Fig. 316). The depression between the levee and the upland is occupied by rice and corn. The upland slope behind the house is occupied by a small patch of bananas, and a clearing on the upland plain is used at present for pasture.

Of the crops the best for export has been cotton. Bags of this are sent by

river steamer upstream 200 miles to the trader's agent in Iquitos to join there the flow of commodities downstream by river or ocean vessel to the Atlantic and world markets.

Other interests of the post are those of the forest and river, including procurement of gums and skins from Indians in exchange for manufactured supplies. The assorted products are shipped with the cotton up to Iquitos (Fig. 317) and thence down the Amazon to the Atlantic. The forest property of the post is owned as legally as the flood-plain clearing, but the property boundaries have no immediate significance. Forest activities of the Indians observe tribal limits but recognize no property lines established by a distant government on scraps of paper, and no international boundary lines either, for that matter.

### 17. ALTO FARM<sup>1</sup> IN THE BOLIVIAN HIGHLANDS

Lake Titicaca in the highlands belongs partly to Peru and partly to Bolivia. Communities clustered about the southeastern end of the lake in Bolivia appear similar to those across the lake in Peru.

The Alto Farm is southeast of the lake, on the gently sloping plateau surface, 35 miles away from and 500 feet above the lake, 13,000 feet above the sea [Fig. 228(17)]. At this distance and elevation the compact settlements of the lake shore have given way to sparse and scattered population. The plateau is bleak and stony. It is the limit of agriculture.

Here is a group of houses, all but one of them abandoned and in ruins, apparently the remains of a small village at a point where a plateau road passes near the edge of an Andean gorge (Fig. 318). Abandonment is not surprising, though the immediate cause

is not evident. At this high margin of settlement, land is tenuously held. The family occupying the one house not in ruins has lived here only a few years and may not remain long. The occupants do not own the land and do not know who owns it. If it has an owner, his hold on it is merely nominal and practically worthless, for the land does not attract personal use or purchasers or paying tenants.

The family at the Alto Farm is of Aymará Indian stock, a father, two sons, and a daughter, all of working age, none of them speaking Spanish. They support themselves on the land. Their only cultivation is a patch of potatoes located conveniently near the house but otherwise at random on the uniform plateau (Fig. 319). Of crops that might be raised here this is the most dependable and productive, in view of the cool, cloudy

<sup>1</sup> Field work in February, 1930. R. S. PLATT, Six Farms in the Central Andes, *Geographical Review*, Vol. 22 (1932), pp. 245-248.

growing season and the light, stony soil. Moisture is sufficient, and gen-

even in this period. Quinoa is an available but not very productive

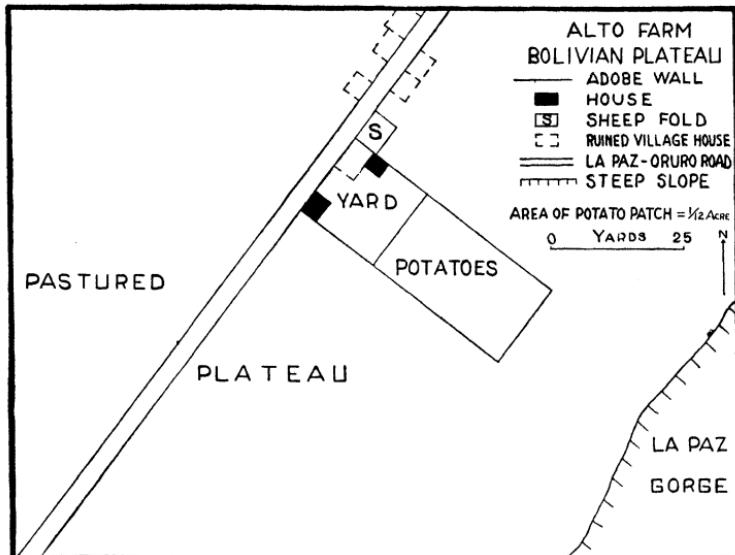


FIG. 318.—Pattern of a farm near the upper limit of agriculture.



FIG. 319.—Yard and potato patch of the Alto Farm. Pile of bush fuel at the left, the two burros in the center, one of the sons at the right. View from the house, looking southeast.

erally 6 months are available for slow crop growth, from November to May, although there is frost occasionally

cereal, and *oca* is a root crop less productive than the potato. Barley is raised sometimes in the vicinity

but generally provides green fodder and not ripe grain.

Potatoes provide the chief nourishment of the family, being preserved in

cotton cloth. The equipment of the family includes two burros used as work and pack animals. The house is of adobe and grass thatch and has a dirt

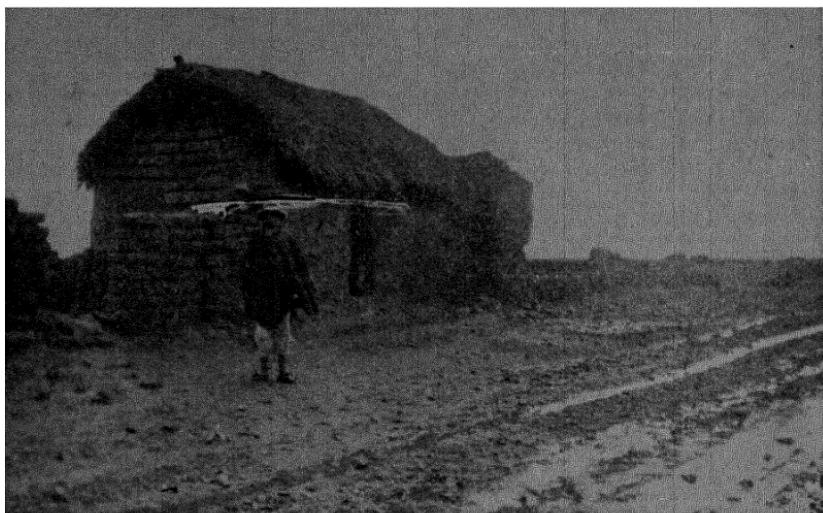


FIG. 320.—Alto Farmhouse, of adobe and grass thatch. View from the road, looking south.

desiccated form for use through the year. But the potato patch is not the only productive asset. The family has 12 sheep which graze on the plateau, generally in a flock with other sheep, cared for in turn by the several owners. The scattered bunch grass of the plateau does not give high carrying capacity but provides sustenance for the few flocks of sheep and llamas that wander on its unfenced expanse.

A good part of the family clothing is homemade, of wool. The surplus of wool is sold as the one regular cash product, making possible the purchase of a few supplies: sugar, salt, coca, and

floor (Fig. 320). Its one room not only contains the family furniture—a bed and a chair—but also is the storeroom for food and fodder, plow and pack harness, and an old sewing machine. Cooking is done in a separate shed. Fuel for cooking is provided by small bushes gathered from the plateau, and water is obtained from a spring below the edge of the near-by gorge.

The members of the family are intelligent, hard-working, and self-respecting, but their living conditions are not agreeable, nor their prospects bright. Indeed, they seem to be near the limit of subsistence.

## 18. MILLUNI TIN MINE<sup>1</sup> IN THE BOLIVIAN HIGHLANDS

In the Eastern Andes of Bolivia, on the west slope of a major peak, is an

outcrop of tin ore [Fig. 228(18)]. The deposit is in several parallel veins in

<sup>1</sup> Field work in February, 1930. R. S. PLATT, Mining Patterns of Occupance in Five South American Districts, *Economic Geography*, Vol. 12 (1936), pp. 340-342.

hard slates close to their contact with the igneous rock of the mountain core. The tin content is about 2.1 per cent.

The beginning of mining here belongs not to the age of bronze but to that of tin cans, in the nineteenth century. The ore was first mined in open pits on the outcrop, then more deeply in irregular burrows. Only recently has the process become systematized to work out the deposits as a

waste rock, space to begin the process of discarding waste matter, by sorting what emerges from the mine. Lower down the slope, transportation lines from the several adits focus on a common point, the stamp mill, located to receive ore by a tramline down the gentle gradient from the lowest adit and by cableway from the higher adits (Fig. 322) and to receive water brought down by a pipe line from glacial lakes.

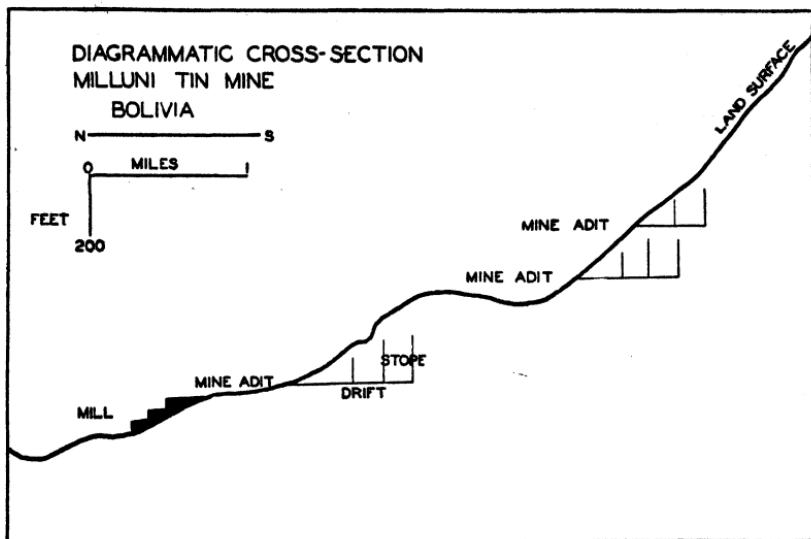


FIG. 321.—Vertical section of Milluni Mine.

whole under control of a British company.

Horizontal drifts penetrate the mountain side and above the drifts ore is mined in shrinkage stopes (Fig. 321). Firm walls and vertical veins about four feet thick permit extraction by this economical method, and the position of the deposit permits removal of the ore by gravity down from the stopes and out of the drifts. Daily about seventy-five tons of ore reach the surface. The mountain side is barren and rocky, but not very steep. At the drift entrance there is space for work sheds and beyond these, for piles of

Close by is a cluster of shops and dwellings.

The mill itself is arranged on the slope to admit ore at the top and carry it through by gravity (Fig. 323). Here the bulk of the ore, 96 per cent of the mass, is eliminated as waste matter, by gravity separation and oil flotation. Some of the discard is in sulphur fumes, which drift away harmlessly on the already barren slopes. The greater part, nearly seventy tons a day of pulverized rock, is washed out at the lower end of the mill in the tailings flume to settle in the barren valley. To carry to the outside

world the smaller volume of mineral product (2 tons of concentrate a day, station 10 miles from the mine. Thus

the pattern of the mine and associated

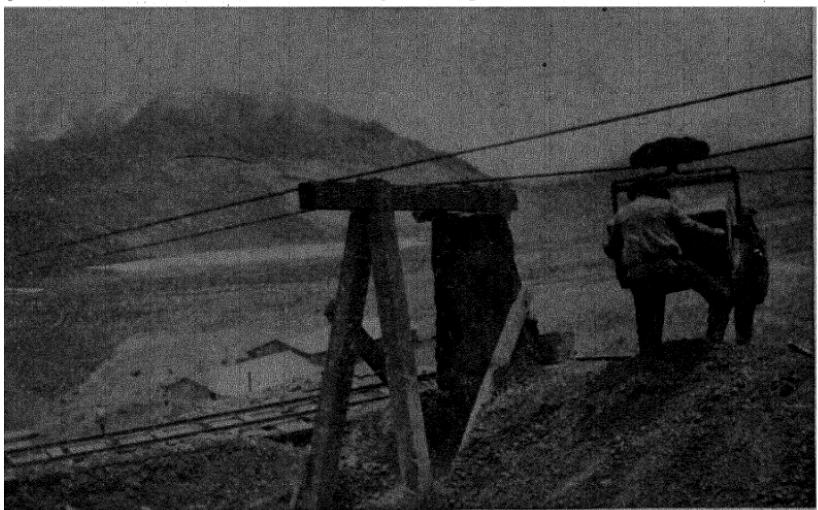


FIG. 322.—Tin ore entering the top of the mill at the lower end of a cableway from mine mouth. Tramline from another mine adit at lower left. Milluni buildings in the valley below. View looking northeast.

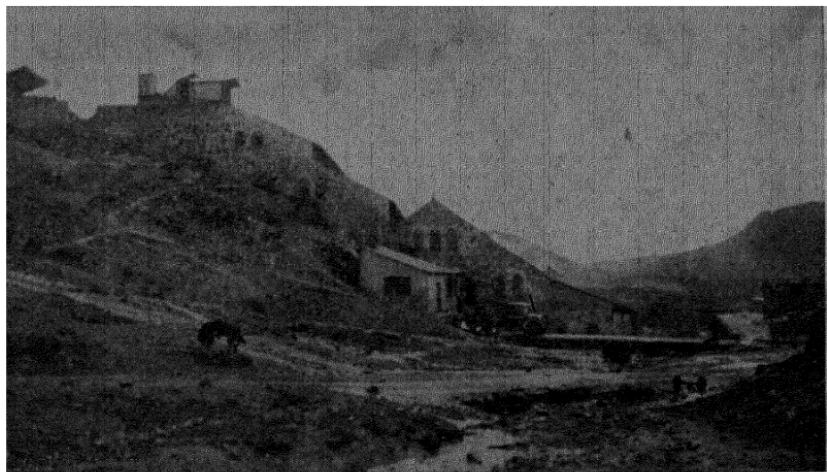


FIG. 323.—Stamp mill of the Milluni Mine. Lower end of cableway at upper left. Truck being loaded with bags of tin concentrate, for transport to railway via motor road at lower right.

containing 1 ton of tin) a gravel road leads down the valley and across a section of the plateau to a railway

establishments is seen to be well-arranged to fit an advantageous site (Fig. 324).

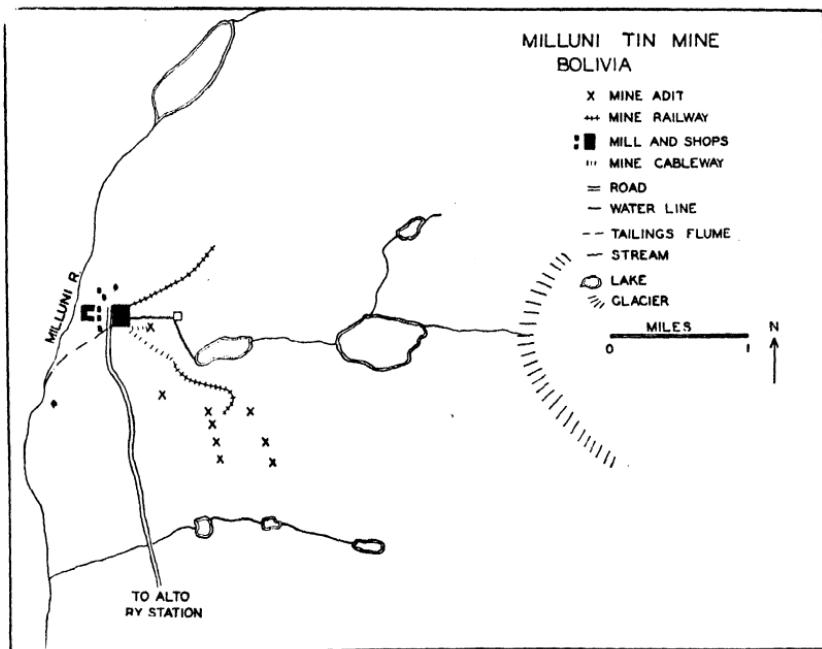


FIG. 324.—Layout of Milluni Mine.



FIG. 325.—Indians en route to market, near Milluni. Altitude 15,000 feet. Snow is not permanent, but common in every season. View looking east over high plateau surface.

Yet Milluni is not known as a mine favored by nature. Unfavorable conditions have to do (1) with its altitude of 15,000 feet and (2) with its isolation from other regions. At this altitude the climate is inhospitable. The rarity of the atmosphere smothers energetic action. The mine is below the permanent snow line, but snow and frost occur in summer as well as winter (Fig. 325). The site of the mine is

Milluni Mine, and another American is superintendent of the mill. The chief office positions are occupied by two Swiss, representatives of a stream of fortune seekers from Europe to the Andes. Working conditions in both mine and mill are relatively satisfactory, with good ventilation and reasonable safety. The low temperature is not a serious disadvantage, except that the formation of ice interferes

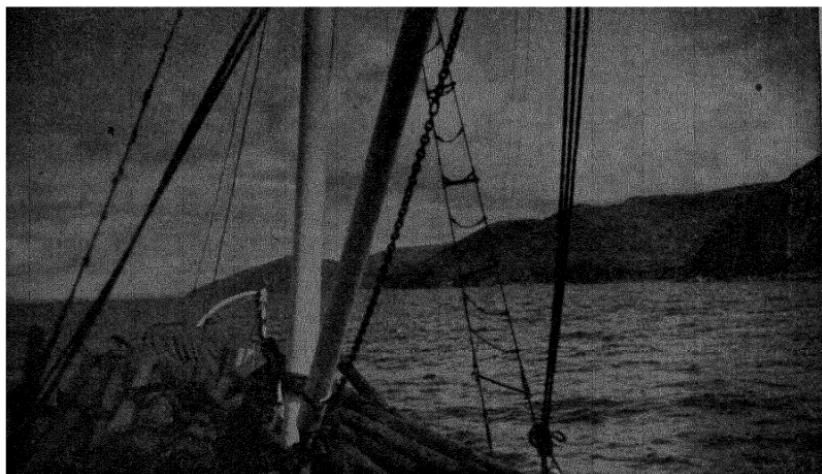


FIG. 326. —Prow of a steamboat on Lake Titicaca, carrying a cargo of imported poles to Bolivia. In the background, rounded slopes occupied by steep potato fields almost to the water's edge. View looking south along the northeast shore of Copacabana Peninsula, which is divided by the boundary between Peru and Bolivia.

practically a desert, more bleak and forbidding than many a dry desert, unavailable for farming, unoccupied by people other than the mine population. In spite of this the supply of labor at the mine is not a critical difficulty. Near by in the highland region the land supports crowded subsistence communities. The mine has 500 Indians as patient and tractable, if not very efficient, miners. Even the problem of supervision by technicians of the Euro-American culture is not difficult to solve. Of numerous mining experts seeking their fortunes in the Andes, one from Minnesota has found his place as superintendent of the

with mill operations in the colder season. Otherwise, water supply from above the mine is sufficient for the mill.

But power is less adequately supplied by the meager flow of headwater streams. A hydroelectric installation provides 170 horsepower for the mill during the warmer, rainier season, but in winter ice and drought combine to cause a deficit of power. Hand drills are used in the mine; shoveling and sorting are by hand; and mules or men are used to move tramcars. Fuel for heat also is a critical need, and the scant resources of the district are laboriously sought. The largest source

of supply is *taquia* (dried llama dung). This fuel is brought by Indian herders, glad of the opportunity to market a cash product. The chief consumer of *taquia* is the roasting furnace whence issue the sulphur fumes. It has been found practicable to supplement the *taquia* with peat; and because there are peat beds on mine property a man

The fuel-consuming process of smelting is not practicable, and tin concentrate is exported to smelters in England even though this involves transportation of almost as much waste matter as of fine tin. The cost of transportation acts as a deterrent in the importation of other supplies as well as fuel. Until recently the mine roof was supported

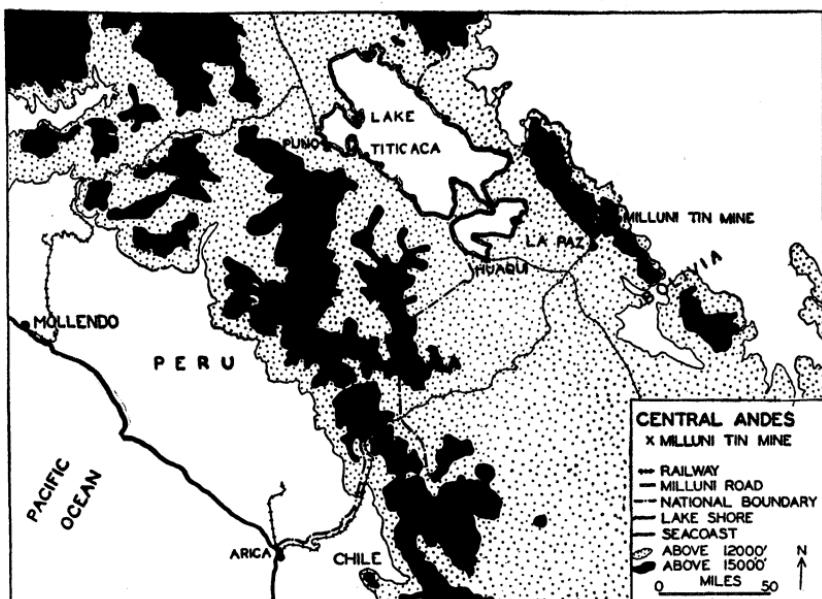


FIG. 327.—Location of Milluni Mine and its connections with the outside world.

and a mule are kept busy bringing in all that can be used of this inferior but cheaper fuel. A more inflammable fuel is needed for kindling the furnaces, and accordingly the *tola* bush of the high plateau is brought in from ever-greater distances. Small supplies of firewood also are brought from the eastern slopes of the Andes. But these resources are insufficient, and other fuels must be imported, their cost multiplied by transportation: fuel oil in drums, gasoline and kerosene in cans, and coal and coke in bags.

by stone vaulting instead of timbering. The mine receives by motor truck an average of a ton of supplies daily: oil from Peru, timber from Puget Sound, miscellaneous equipment from the North Atlantic, food and clothing from near and far. In return, it sends out daily 2 tons of concentrate, by motor truck to a railway storehouse, by rail across the plateau, by steamboat across Lake Titicaca (Fig. 326), by rail in southern Peru down to the sea at Mollendo, and by ocean steamship to England (Fig. 327).

## Chapter VIII. Chile and Argentina

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Chile and Argentina are the great, versatile, modern, middle-latitude, south-end countries of Latin America. They are about as much alike as California and Texas, and about as different.

As middle-latitude countries their populations are in lowland plains, and their highlands are sparsely settled outlying areas (Fig. 328). It is noticeable that between Chile and Argentina the Andes are a border zone split by the boundary, in contrast with countries of the tropical Andes, where highland sections are occupied by population centers and eastern boundaries are far east of the highlands in sparsely settled lowland plains. These facts are not accounted for by the greater width of the continent and of the highlands in low latitudes.

In view of the comparison with California and Texas, the question may arise as to why there is an international boundary, either high or low, between Chile and Argentina. This can be answered only by reference to contrasted trains of events: in North America, an organized population group growing and extending its occupancy over near-by unoccupied regions and finally taking and occupying outlying border-lands weakly held by the far-off Mexican center; in South America, separate centers of population and administration well-established before independence, each dominating its own vicinity and neither dominating the other—Chile and Argentina.

CHILE is distinctive in its long narrow form, narrower and longer than California, confined to more constricted lowlands west of a more persistent highland barrier, and prolonged to more than triple the length of California, from the latitude of the Mexican tropics to that of southern Alaska.

Yet Chile conforms to the familiar general plan of countries, in having a populous and productive central region, secondary provincial districts, sparsely populated outlying areas, marked regional variety, and boundaries in unfruitful regions (Fig. 328).

With respect to major regions of Latin America, Chile occupies the western side of the southern end of the western highlands and adjacent

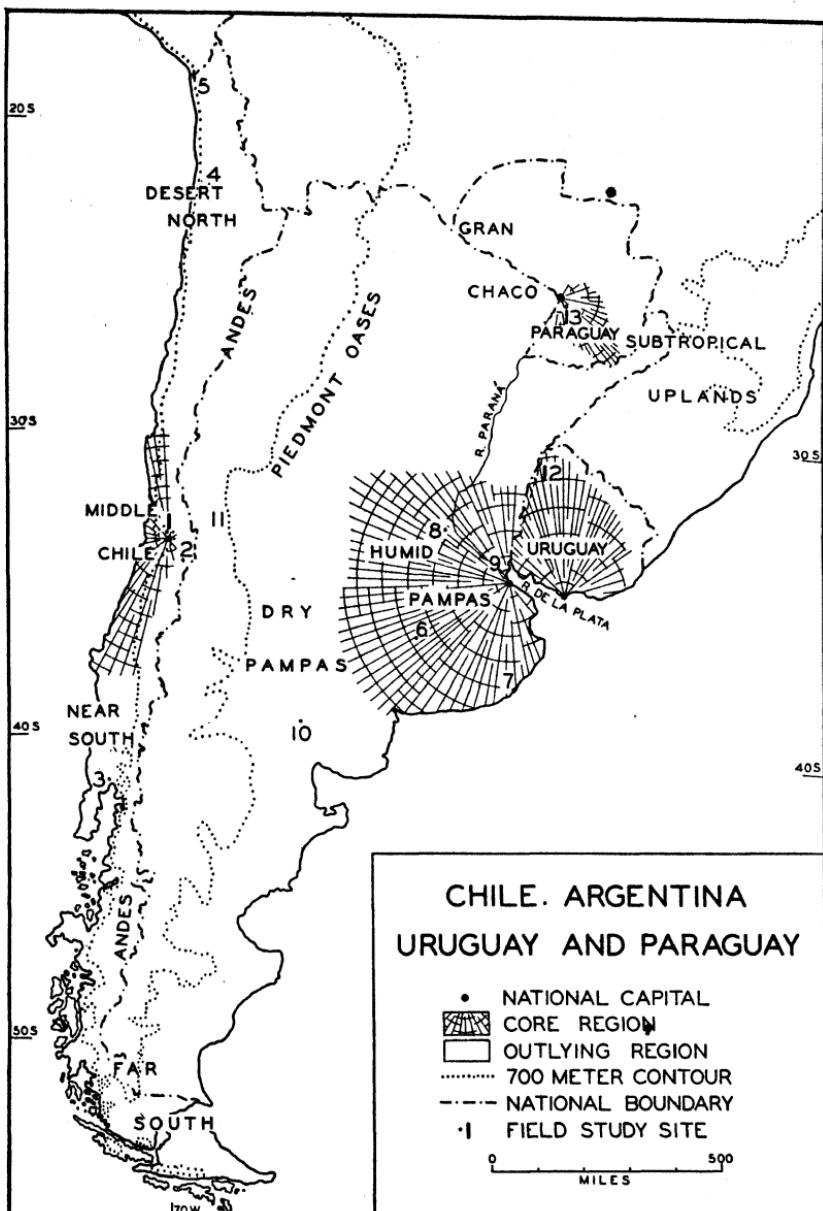


FIG. 328.—Regions of the four southerly countries. Study sites numbered in the order of discussion, first in the core and outlying regions of Chile, then in the core and outlying regions of Argentina; and finally, for discussion in Chap. IX, a traverse route in Uruguay and a rural site in Paraguay.

coastal lowlands (Fig. 3, page 11). In the highlands, climatic distinctions are superfluous; *tierra fría* with chronic frost prevails. Sections of the lowlands are distinguished climatically as having one low latitude and two middle-latitude types, corresponding to the dry and rainy regions of Pacific North America from Baja California to British Columbia: low-latitude desert, dry subtropical, and humid cool (Fig. 4, page 12).

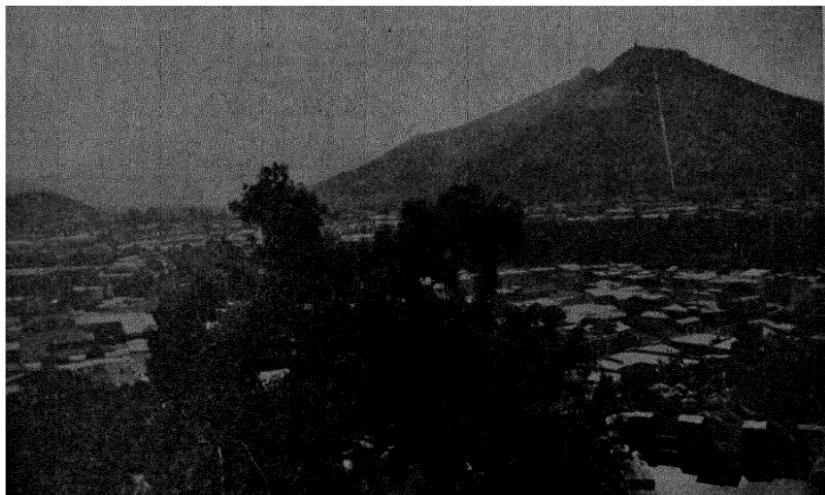


FIG. 329.—Santiago, capital of Chile. View looking north from a hill park (Cerro Santa Lucia) in the city. The course of Rio Mapocho is marked by trees across the picture in the middle distance. The canal to Vina Conchali (1) leaves the river farther upstream and skirts the mountain spur (Cerro San Cristobal) in the right background. The ascending line on the *cerro* is a tramway to a park on the summit. Altitude of the city 1,800 feet. February, 1930.

The core of the country, Middle Chile, has a dry subtropical climate (Fig. 329). It is like southern California not only in climate but also in productivity based on alluvial lowlands receiving runoff from snowy mountains. Beyond this the comparison is not to be pressed. The inhabitants of Middle Chile are mainly of Spanish and Indian blood. The civic organization is more akin to that of Mexico than that of California. The region is the center of a country in which there is no other great market region to which it can sell specialty products, only lesser outlying regions to which it can furnish labor and supplies (Fig. 8, page 16).

The desert region of northern Chile is of negative significance except for minerals. But by reason of minerals it has been for many years a mainstay of Chilean economic and political strength. Initiative born in Middle Chile took the desert and made it a national asset, with little

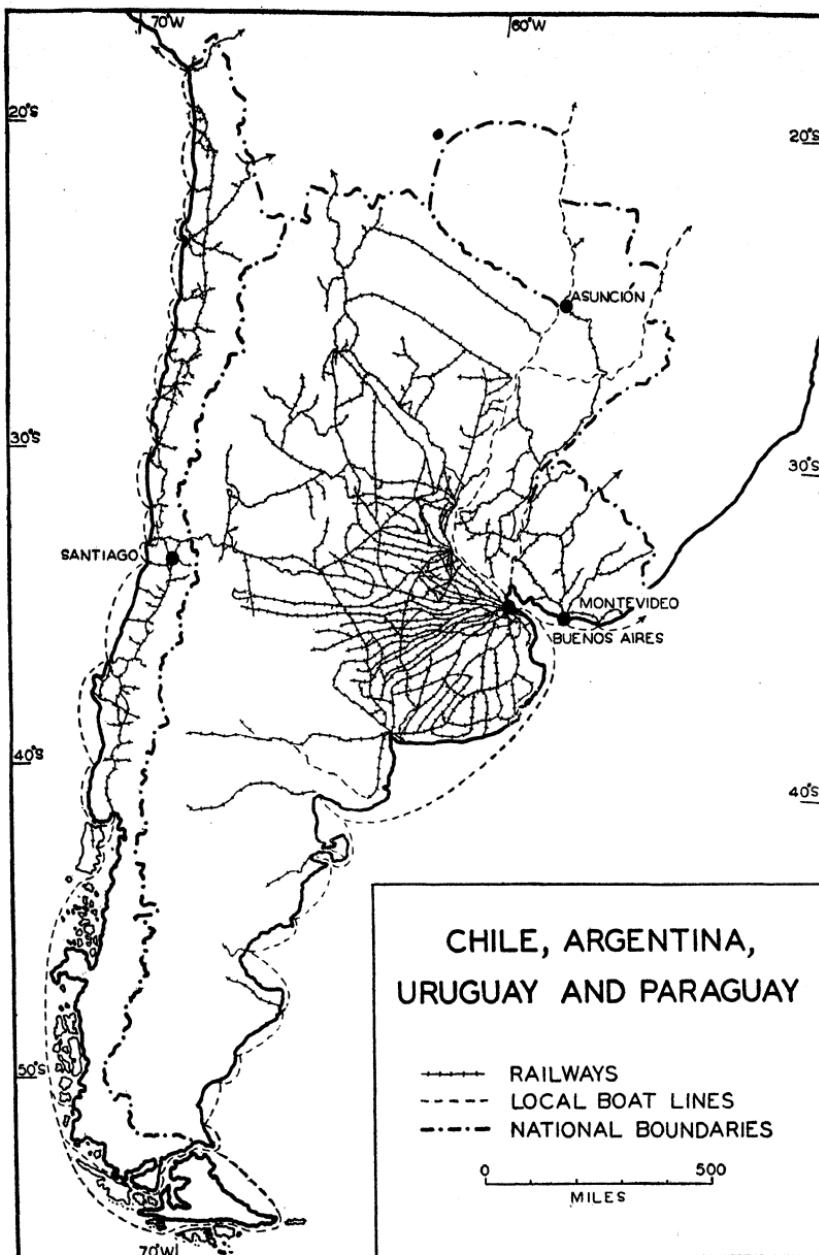


FIG. 330.—A coherent system of land and water transport in each country, fairly adequate for national unification, even apart from airlines (Fig. 508).

competition from Bolivia and Peru. The northern boundary of Chile approximates the southern boundary of Peruvian coastal settlement. It is significant that prolonged controversy concerned only the southernmost Peruvian oasis, Tacna and Arica, and did not include the nitrate desert, used only by Chile.

The regions south of Middle Chile are humid and cool. The Near South has become so closely associated with the central region as to be almost a part of it. But the term "South Chile" still commonly is applied to the Near South as the one important southern region, clearly distinct from Middle Chile in climate, in forest and farm interests like those of Puget Sound, in long-standing settlement by Germans, and separated from Middle Chile until the middle of the nineteenth century by a barrier of unconquered Indians at the forest border.

The Far South, including not only the Pacific coast but also the shores of the Strait of Magellan eastward to the Atlantic, belongs to Chile as a sign of interest in the old route to the Atlantic and not because of a primary interest in rocky fiords and Patagonian sheep ranches.

The transportation system of Chile is a natural and effective one, with the sea as a main highway and short railways as branches penetrating the land where required (Fig. 330). A longitudinal railway through the northern desert is an accessory route not required for productive traffic use. Domestic air lines are less needed and less emphasized than in the low-latitude highland countries. Though Chile is long in measured distance, it is in effect a compact and coherent unit as compared with its low-latitude neighbors.

Both Chile and Argentina are normal modern political units befitting their natural setting. Yet neither country could reasonably have been foreseen in its present form during the Spanish Colonial Period—at least, not in detail, and Argentina not even in a general way.

ARGENTINA is a very modern phenomenon. Its present territory was not significant in Colonial times, lacking precious metals and sedentary population, and located on the periphery of Spanish activity. The present core of the country, the Humid Pampas region, was unimportant, unattractive for habitation or productive enterprise, infested by roving Indians. The port of Buenos Aires (Fig. 331) was established on its coastal margin and became an Atlantic outlet and administrative center for a bit of Spanish America; but its jurisdiction did not coincide with modern Argentina, and some outlying Argentine districts were attached at times to other South American centers.

The first sign of superior vigor in the Humid Pampas was a display of fighting strength by cowboys of the ranges, leading on to independence from Spain. This did not guarantee lasting importance for the Pampas, as shown by analogy in Venezuela, where the Llanos region supplied cowboy

fighting strength for winning independence but is now only an outlying region in a smaller country.

Another sign of superior Argentine capacity, distinct and decisive, appeared much later (under the stimulus of steam navigation, refrigeration, and demand for food in industrialized Europe), when the Humid

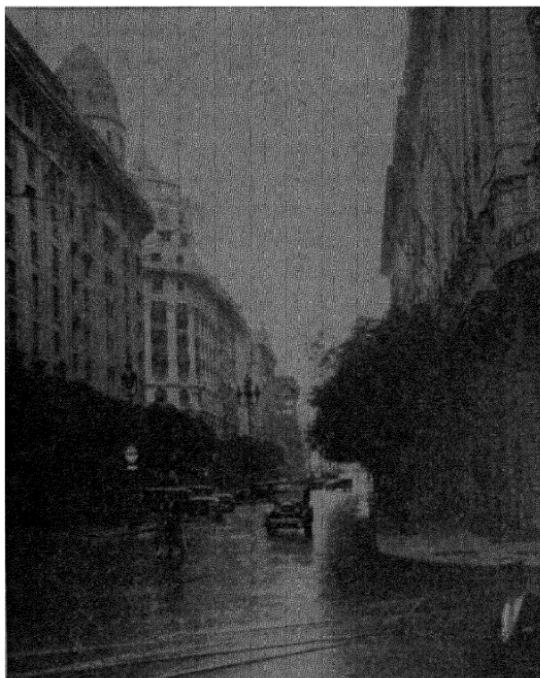


FIG. 331.—Buenos Aires, capital of Argentina. A street in the financial section. View looking northwest, March, 1930.

Pampas region became a specialized farming area and was discovered to be a plain unique in its combination of extensive unbroken fertility, mild moist middle-latitude climate, and coastal accessibility (Fig. 328).

The core region of Argentina does not resemble closely any other region in the world. It is only vaguely like central Texas, with which it is classified as having the same general type of climate, humid subtropical (Fig. 4, page 12), and expanses of smooth fertile land, formerly grass-covered (Fig. 5, page 13) and now used for commercial production of crops and cattle. The similarities are few and broad as compared with the differences that appear in the precise qualities of the natural environment, the people, the economic, political, and social organization, and the interregional relations.

The population of the core of Argentina is the most cosmopolitan in Latin America, if the term "cosmopolitan" may be used of a recent and restless mixture of peoples, though lacking such Indian and Negro elements as there are in other countries. The mixture is composed of white European stocks—a base of Colonial Spanish, and lately recurring increments from Italy, Spain, and northern Europe.

The outlying regions of Argentina are variegated, with the customary common characteristic that all are subsidiary to the core region: to the west of the Humid Pampas are dry pampas, semiarid plains, and uplands; in the far west a share of the Andes, with piedmont oases at their foot; in the far south a share of the Patagonian cold steppes and their sheep ranches; in the far north a share of the quasi-tropical Gran Chaco; and in the far northeast a tiny share of the Brazilian highlands (Fig. 328).

These areas are identified among the major regions of Latin America as including the bulk of the Paraná lowlands and Patagonian highlands and small adjacent sections of the Western and Brazilian highlands (Fig. 3, page 11); as having principally mild middle-latitude climates differing decisively in rainfall, with a northern border of low-latitude climate, a southern border of high-latitude climate, a western border of middle-latitude highland climate, and a northwestern bit of low-latitude highland climate (Fig. 4, page 12).

The Argentine cluster of regions and semiregions is held together by the greatest array of transportation lines in Latin America (Fig. 330). The Humid Pampas are covered with a network of railways focusing on ports, particularly Buenos Aires—a matchless network (at least so far as Latin America is concerned) reflecting the matchless coincidence of heavy commercial production, spread over a compact accessible area, and easy construction and maintenance on smooth grassland without valleys, floods, or snows. The outlying regions also are connected with Buenos Aires: by railways from the far west, southwest, and northwest; by the Paraná River and railways from the far north; and by coastwise shipping from the far south. Domestic air lines are not so important as in countries less well supplied with surface transport. International air lines are important, reaching to Buenos Aires as a southern focus of intercontinental traffic.

**INTERNATIONAL RELATIONS.** The characteristics and problems of Chile and Argentina are more like those of the United States than is the case with any country previously discussed. Similarity has led to competition and rivalry, particularly between Argentina and the United States. Evidently cooperative relations among middle-latitude countries of the Americas are to emerge not from complementary differences but rather from common problems. Cooperation among like groups of people may well lag behind cooperative interchange among unlike groups. But

cooperation based on common interests and problems has developed well among like groups within a single country (within Argentina, within the United States), and a similar development of mutual understanding and aid is to be expected among like countries, for the benefit of all concerned.

### Field Studies

The Chilean and Argentine field studies that follow reveal characteristics and problems similar to those of the United States. They also show differences between Chile and Argentina, although, as in previous chapters, the emphasis is not on comparison between nations but on varieties of occupancy from region to region.

*In Chile.* The core of Chile is a region of specialized Mediterranean agriculture watered by streams from the Andes. The Viña Conchali is an example of intensive occupancy (1). Other types of farming not specifically represented are grain and livestock farms and fruit orchards.

One of the great copper mines of the country is in the Andes of Middle Chile, the Braden Mine (2).

For the Near South, with its forests and cool-climate farms, there is only a glimpse of a dairy farm near Lake Llanquihue (3). The Far South, with its sheep ranches near the Strait of Magellan, does not appear in the studies.

In the Desert North, nitrate production has been the great distinctive type of occupancy. Maria Elena is the largest and most modern nitrate plant (4). Two great copper mines in the north may be classed with the Braden Mine in Central Chile but are not specifically included among the field studies. Agriculture is insignificant in northern Chile, as indicated in the glimpse of a small farm near Arica (5).

*In Argentina.* The great and complex development of the core region of Argentina is an outstanding modern phenomenon of Latin America. Within this region there is considerable variety from place to place. The varied characteristics are not fully covered in the field studies, but the great complexity of occupancy is indicated in the field study of Pirovano, in the midst of the region (6); and the variety in different parts of the region is indicated in the studies of estancias on the eastern margin of the region (7) and of small farms in the northern part of the region (8). The Paraná Delta is a small distinctive district near the city of Buenos Aires, represented in the study of Isla Scarsi (9).

The outlying regions of the country are larger in area but smaller in population, production, and national importance than the core region. Occupancy in the dry pampas of the west and south is represented by a sheep ranch in northern Patagonia (10). This is not to be taken as representative of sheep ranches in the cooler and less arid steppes of the far

south, which are not included in the studies. Oases at the foot of the Andes form the chief communities of western and northwestern Argentina. One of these is represented in the study of a vineyard in Mendoza (11).

The subtropical northern and northeastern regions of Argentina (the Gran Chaco, and the provinces of Entre Ríos, Corrientes, and territory of Misiones) are not specifically represented by studies but have been included in traverse observations and generalizations and are represented in some respects by studies in the neighboring countries of Uruguay, Paraguay, and Brazil.

### 1. CONCHALÍ<sup>1</sup>

#### A VINEYARD IN MIDDLE CHILE

In the heart of Chile is a small rural estate known as the Viña Conchali it has one, more truly than do various wider nations.



FIG. 332.—Viña Conchali and other farm lands in the Central Valley near Santiago.

[Fig. 328(1)]. The shape of Chile may not suggest that it has a heart; but at a point where one of the major

<sup>1</sup> Field work in March, 1930. R. S. PLATT, Items in the Chilean Pattern of Occupance, *Bulletin of the Geographical Society of Philadelphia*, Vol. 32 (1934), pp. 33-39.

streams, the Rio Mapocho, leaves the Andes to cross the valley plain. The Viña Conchali is 4 miles north of

of the dry subtropical climate is almost rainless; the cool winter is moist enough to ward off absolute desert

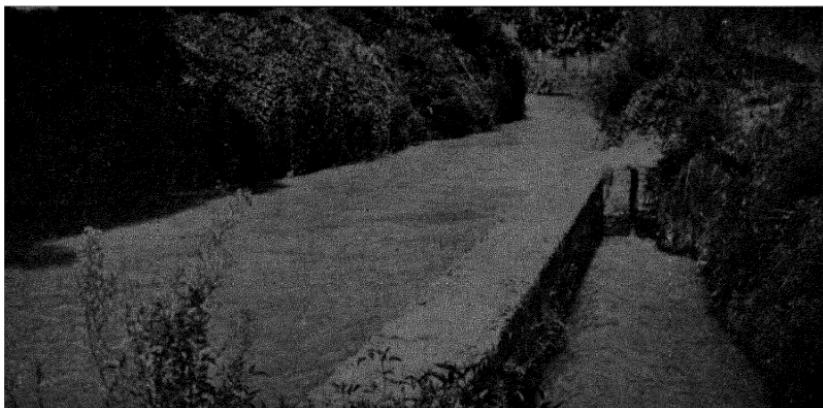


FIG. 333.—Irrigation canal at left, and upper end of Viña Conchali canal at right receiving water through a vertical slit 5 inches wide. Whether the main canal is full or nearly empty, Viña Conchali, like every other property on the route, receives its proportional share of water.

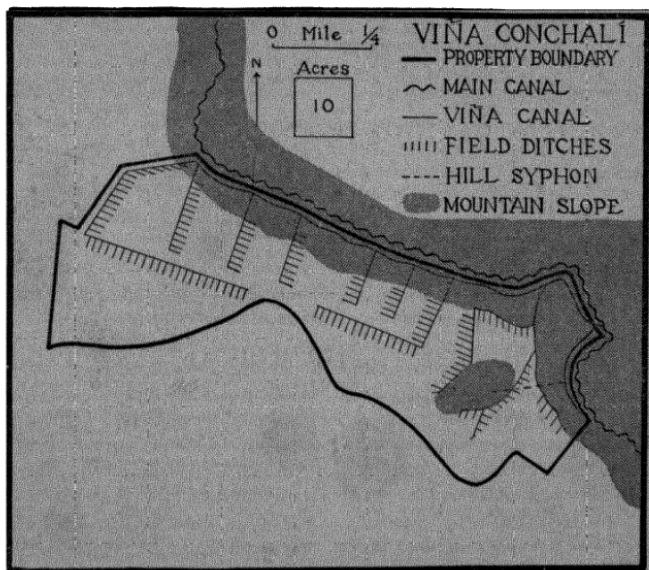


FIG. 334.—Irrigation system of the vineyard.

the city in an alcove of the plain at the foot of a mountain wall (Fig. 332).

Semiaridity marks the plain in its natural state. The long hot summer

conditions but not to water crops. Therefore the development of the district depends in large part on the proximity of the high Andes with their

winter snows, from which in summer rivers flow.

Water runs only spasmodically and uselessly in the gullies and ravines on the slopes adjacent to the Viña Conchali. The water rights that attach to and give value to the property are

property is 275 acres, of which 100 acres are in steep slopes and 175 acres in the valley plain. The tract is irregular in form, defined by metes and bounds, most of it included between the canal on the mountain side and a road in the valley (Fig. 334).

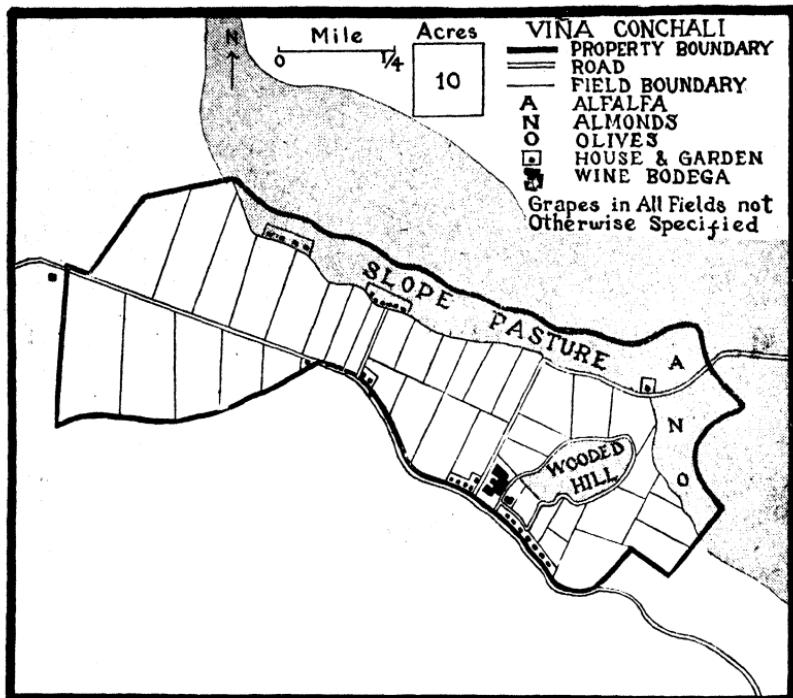


FIG. 335.—Fields and houses of the vineyard.

based on the flow of the Rio Mapocho. Water diverted from the river just above Santiago is carried in a canal, which winds its way around spurs and reentrants and descends at a gradient less steep than that of the river and valley plain until it reaches the mountain side along the upper boundary of the Viña Conchali (Fig. 332). There the viña receives its share of the water through a slit 5 inches wide, sufficient to provide for irrigation of all the available land (Fig. 333).

**VIÑA PATTERN.** The size of the

From the main canal, water is distributed in secondary canals along the upper edge of the property and down into a system of field ditches carefully laid out to take advantage of minor irregularities in the plain to carry water by gravity flow to every corner of the property—southward with the general slope, westward and eastward into a shallow draw, and across by siphon to a detached hill.

This pattern of ditches, together with a pattern of roadways laid out to give access to the land, divides the

valley portion of the property into 40 fields, ranging in size from 17 acres to 1 acre (Fig. 335).

In this setting the owners have developed through many years a high-grade wine vineyard, similar to others in the Central Valley but surpassed by none in the excellence of its product.

Vines occupy practically all the 40 fields of valley land, all of alluvial

blood. The proprietors of the vineyard, Chileans of Spanish blood, do not live on the property. The principal house is occupied by the manager, a Frenchman skilled in wine production.

The wine bodega (press and storehouse) as well as the manager's house and the largest group of laborers' houses is located near the foot of the cedar grove hill, at a road fork,



FIG. 336.—View in Viña Conchali looking south from the mountain slope just below the irrigation canal. In the foreground, rough pasture slope; at the foot of the slope, laborers' houses and their fields of corn and other supply crops; below the slope, vineyard area and bordering highway; beyond the vineyard, fields of other farms, occupied by alfalfa, wheat, and other food and fodder crops, not by vines.

silt soil, deep and fertile, well-drained and well-watered. The slope land also is subject to irrigation from the canal along its upper margin, but it is less fertile as well as being inconveniently steep and is given over to fodder and tree crops: untilled pasture, a field of alfalfa, experimental plantings of almonds and olives, a grove of cedars on the detached hill. The only other agriculture is of subsistence crops—corn, beans, potatoes, melons—in small patches behind the laborers' dwellings, which are distributed along the base of the slope and along the road (Fig. 336).

There are 26 such houses in which live the fixed inhabitants of the estate, Chileans of mixed white and Indian

the main transportation focus of the estate (Fig. 335).

**WORK CYCLE.** The functioning of the whole establishment moves in the annual cycle of grapes and wine. The winter, from June to September, is cool and sometimes frosty: the vines are dormant; weak plants are rerooted; canals are emptied and cleaned. The largest expenditure of labor at this season employing 40 to 60 men is in pruning the vines. All are cut back carefully and thoroughly to provide for the bearing of the fruit on young wood.

In spring, from October to December, the growing vines are tied up to the supporting wires, and the ground

is cultivated. In summer, January to March, more tying is needed, and tucking back of vines, to expose the ripening grapes to the sun (Fig. 337). Cultivation continues and irrigation begins. Water flowing day and night into the vineyard through the narrow slit is directed to one place and then another, so that every part of the vineyard will be irrigated every two or three weeks, according to its needs, until harvest time in autumn.

None of the work of the foregoing seasons is so intensive and exacting in

midst of the vineyard at the focal point of vineyard transportation reflects the need for immediate treatment of the perishable crop and also the incentive to near-by reduction of the bulky fruit to a more compact product by a relatively simple process requiring little power, machinery, or labor. Storage vats are the largest item of equipment, to hold and perfect the vintage of a year. The product is of red wine in three grades and white wine in three. The annual output of the vineyard is about 2,400 tons of grapes,



FIG. 337. Workers of Viña Conchali, tying up vines just before harvest.

time as is the harvest from March to May, when 120 laborers are needed.

In order to relieve the strain and extend the harvest period, eight different varieties of grapes have been planted to ripen successively. Incidentally, this practice has resulted in some diversification of product to include table grapes for the Santiago market. But French wine grapes, red and white, are still the major interest.

The bunches are picked with scissors, gathered in baskets, carried to an oxcart on the nearest road, trampled down in tubs, and transported to the wine bodega. The presence of the wine-making establishment in the

from which 800 tons of wine are made, somewhat less than 1 per cent of Chilean wine production. The finished product is transported by truck to a warehouse in Santiago whence it is distributed to the Chilean market.

Although the Viña Conchali is typical of development in the heart of Chile, there are various other kinds of establishments no less characteristic. Fruit orchards are similar in their relations. Cattle farms are less intensive than vineyards and occupy more land. Grain farms are numerous. Farther south, greater rainfall allows the growing of winter wheat and grapes without irrigation.

## 2. BRADEN COPPER MINE<sup>1</sup>

### IN THE MIDDLE CHILEAN ANDES

In the Andes of Middle Chile, on the side of a canyon, is an outcrop of copper ore [Fig. 328(2)]. The deposit is in a mass of volcanic tuff. A horizontal cross section has the form of a crescent with a maximum length of 1,400 feet

and stamp mill. Now the major development, by an American company, is in the larger deposit, similar in pattern but on a greater scale (El Teniente Mine of the Braden Copper Company). A drift penetrates the mountain side

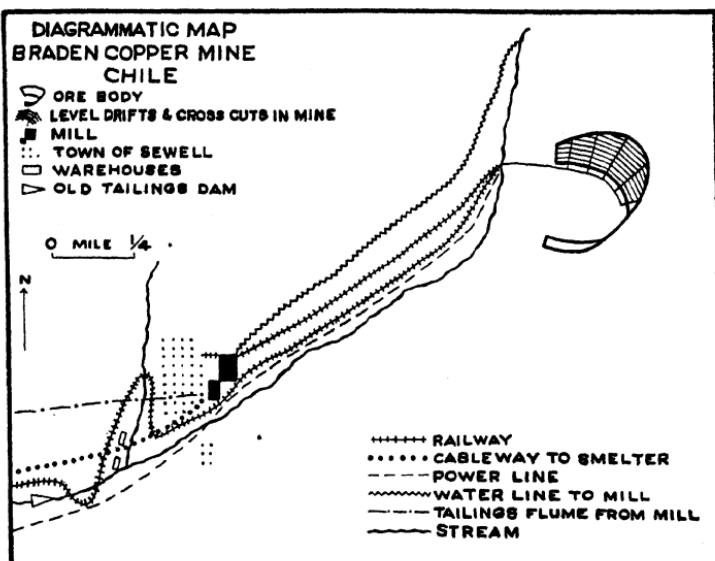


FIG. 338.—Producing area of the Braden Copper Company: El Teniente Mine and mill town of Sewell.

and width of 800 feet (Fig. 338). From the outcrop the structure extends downward nearly vertically, forming one side of what is apparently a filled crater, the other side of which is marked by a smaller deposit. The copper content is about 2.1 per cent.

**UNDERGROUND.** Here mining is a recent matter. There has been no open-pit digging or shallow burrowing on this nearly inaccessible outcrop of sulphide ore. The first mining was in the smaller deposit with drift, stopes,

from the bottom of the canyon; and, from this base line, shafts extend upward to the top of the ore body 2,000 feet above (Fig. 339).

Mining is by the caving system. In this massive deposit, it is possible to form stopes so wide that the roof caves in under the pressure of the overlying rock and the ore is brought down automatically. From upper levels, the ore descends through gravity chutes to cars in the drift at the bottom of the mine. As upper levels are worked out,

<sup>1</sup> Field work in February, 1930. R. S. PLATT, Mining Patterns of Occupance in Five South American Districts, *Economic Geography*, Vol. 12 (1936), pp. 344-347.

operations retreat downward. Thus the form of the mine allows production with a minimum of stoping, filling, timbering, and hoisting. The daily output of ore is about seventeen thousand tons.

**CANYON SITE.** Outside, conditions seem less favorable than underground. Precipitous slopes occupy the landscape. The rocky peaks above have an

confluence forms a spur not too steep for building on the surface (Fig. 341). Here space is found also for the mill, which separates 16,000 tons of waste matter daily, 94 per cent of the ore, from 1,000 tons of copper concentrate. The gradient of the canyon is so great that the mill is built high up on the spur and yet is lower than the bottom of the mine and therefore in a position

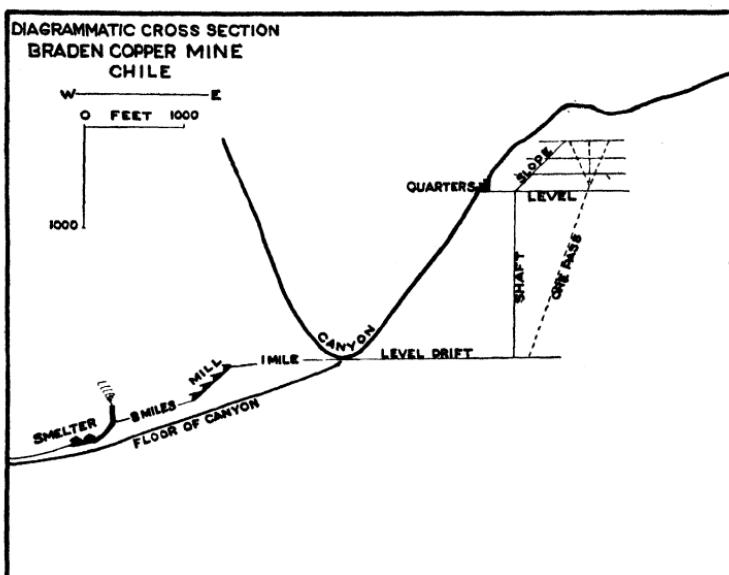


FIG. 339.—Vertical section of the mine and associated establishments.

altitude of 12,000 feet, and the bottom of the canyon 8,000 feet above the sea. Here is no place for buildings at the mine mouth. To house mine laborers, quarters have been constructed in an excavation on the canyon wall where the top of the main shaft approaches the surface. The buildings are largely subterranean and are inaccessible except by way of the shaft. These are boardinghouses for 1,500 men (Fig. 340).

For other miners and associated workers a town (Sewell) has been built a mile downstream where a tributary

to receive ore hauled downgrade from the mine mouth (Fig. 339). A water supply likewise coming from the bottom of the canyon farther upstream flows to the top of the mill under pressure (Fig. 338).

Tailings from the bottom of the mill formerly were deposited in the canyon just below, but space there was inadequate for continued accumulation of 16,000 tons a day. Now the problem of disposal has been solved by a 10-mile flume carrying the waste material out of the canyon to a spacious upland area, further advantage being

thus taken of low-gradient transportation alongside the steeply graded canyon (Fig. 342).

The remaining 6 per cent of the ore recovered from the milling process, composed of one-third copper and two-thirds waste matter, is transported

bucket loads of concentrate a day, connect the mill with the next establishment, the smelter, located 8 miles downstream where the canyon first widens to afford convenient space for buildings. This is a suitable site for functions attracted less strongly to the

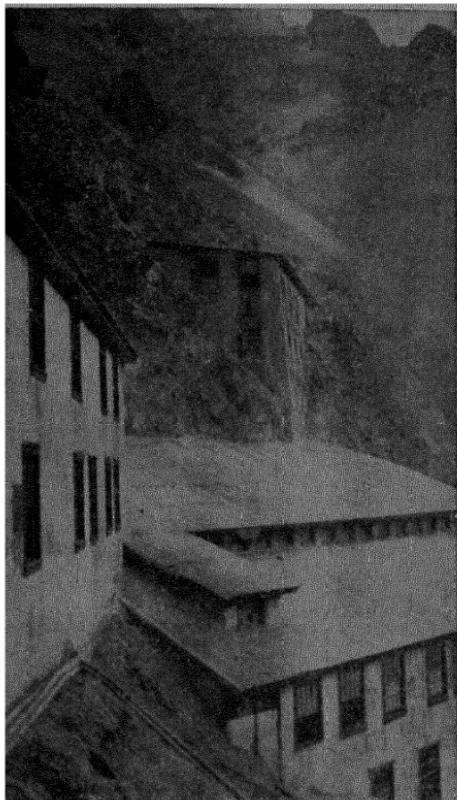


FIG. 340.—Miners' quarters in the canyon wall, accessible only through subterranean entrance, El Teniente Mine.

from the mill in buckets on a cable line down the canyon. A high-tension power line and narrow-gauge railway also follow the canyon, the former independent of steep slopes in bringing power up to the mill and mine, the latter winding its way laboriously along canyon walls. All three of the canyon transportation lines, but particularly the cableway with its 1,000

mine, beyond the point where 94 per cent of the ore has been discarded. The smelter removes the remaining 4 per cent waste matter, most of it sulphur driven off from the chimney, the rest of it slag dumped on the slope below. Copper ingots emerge from an ultimate refining process. On down the valley are the sites of other associated establishments, each selected

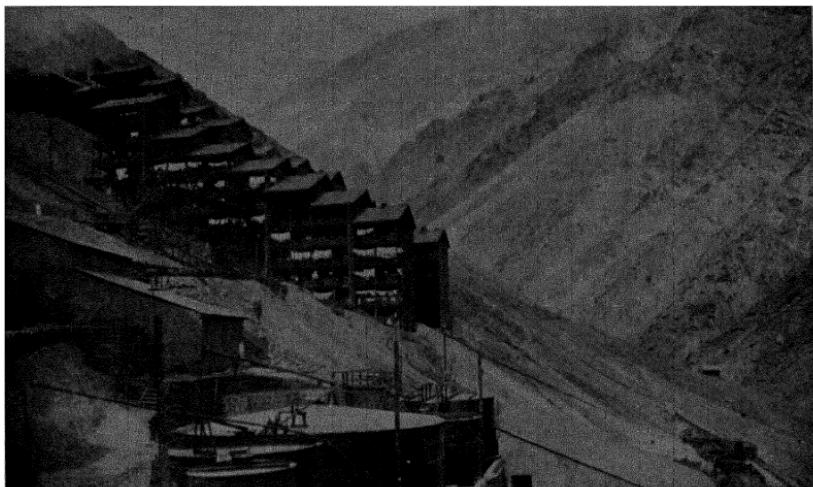


FIG. 341.—View from the Braden mill at Sewell northeast up the canyon to El Teniente Mine. Laborers' quarters accessible by surface paths.

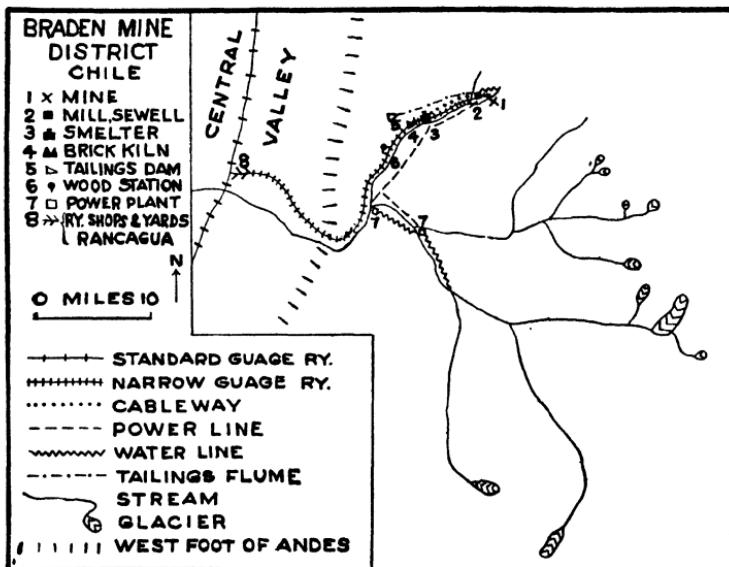


FIG. 342.—Braden Mine establishments, from the canyon to the Central Valley.

with reference to its natural suitability [Fig. 342(4) to (8)]: a brick kiln near the smelter, a wood station in the lower wooded part of the valley, power plants on a confluent river, railway shops at the junction of the narrow-gauge line with a public railway.

Strict conformity to the exigencies of the canyon site are evident throughout the mine pattern above ground as well as below.

**SURROUNDINGS.** Apart from these site conditions the regional circumstances of the mine are not bad. Ruggedness and altitude make the mine area nonagricultural and uninhabited except by the mine population. But the altitude is not too great for human health and comfort, and only 30 miles away the canyon opens into the densely populated agricultural area of the Central Valley. Here is a ready source of labor, 4,000 men for mine, mill, and smelter, many of them farmers, becoming passable miners. Here is a source also of food and other supplies for the district. The technical and administrative staff of about two hundred is obtained from North America and Europe without special difficulty.

In the canyon above the smelter there is a winter snowfall averaging 25 feet, but this does not interfere with operations under cover in mine and mill. Precipitation in the upper valley including snow and rain pro-

vides the 90,000 tons of water daily needed in the mill. Freezing, however, interferes with mill operations in winter, imposing a limitation that at present is partly met by pumping water from the canyon below the mill and in future may be eliminated by a 20-mile pipe line from the confluent river on which the power plants are located (Fig. 342). For power purposes this other stream, with its larger watershed and a fall of 2,000 feet in 15 miles, has served to provide 50,000 horsepower, energizing the whole series of establishments from mine to railway junction. A limitation of the water supply at this lower point in the stream system is felt not during the winter season of freezing but during the summer season of light rainfall.

In addition to these various needs met by resources of the region, other supplies move into the canyon from the outside world: tank cars of fuel oil for the smelter from Peru or California; drums of flotation oil for the mill from Scotland; timber from southern Chile and Puget Sound; machinery from North America and Europe. In return, the product of the mine moves out of the canyon, 300 tons of copper daily, by company railway to the Central Valley, by state railway to the sea at San Antonio, and by ship to North America or Europe.

### 3. LLANQUIHUE<sup>1</sup>

#### A FARM IN THE CHILEAN NEAR SOUTH

Increasing rainfall from north to south, coupled with decreasing temperatures, is one key to regional differences between Middle Chile and the Near South. In contrast with the broad irrigated valley plains of the middle region are the intermingled forests and farms of the south. One example is a

farm in the Central Valley south of Lake Llanquihue, hewn from the cool rain forest and only partly cleared [Figs. 328(3), and 343] of about the same size as the Vina Conchali but supporting only one poor family on the proceeds from a small herd of cows grazing on cutover land and wet

<sup>1</sup> Field work in March, 1930. R. S. PLATT, Items in the Chilean Pattern of Occupance, *Bulletin of the Geographical Society of Philadelphia*, Vol. 32 (1934), pp. 40, 41.



FIG. 343.—Forest at the foot of Volcan Osorno, near the shore of Lake Llanquihue.

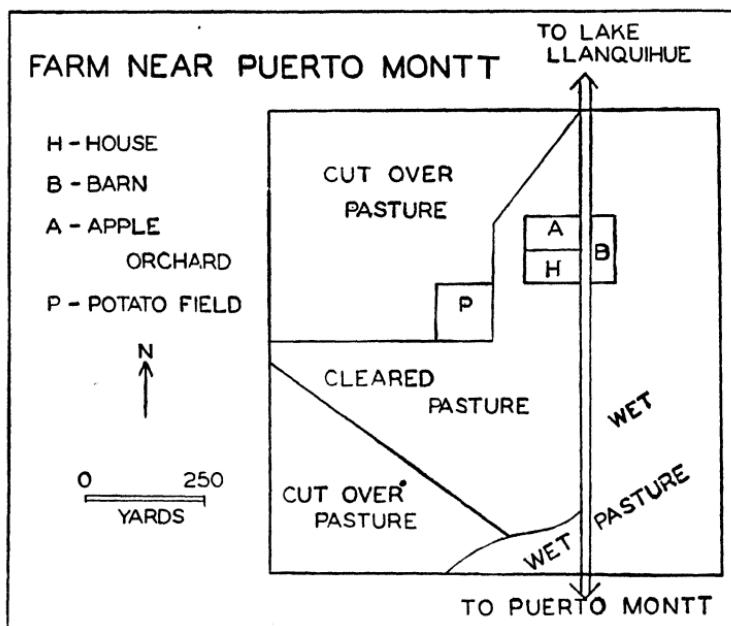


FIG. 344.—Field pattern of Llanquihue Farm.

pasture (Figs. 344 and 345). The marketable product is butter. A potato field and an apple orchard provide some of the food for the household. The people are German immigrants.

Most of the farms in the district are similar, although this one is poorer than the average, having a higher proportion of poorly drained and stony land.



FIG. 345.—Llanquihue Farm. View looking south along the road from the orchard fence; farmhouse on the right, barn on the left, pastures in the background.

#### 4. MARIA ELENA<sup>1</sup>

##### A NITRATE PLANT IN THE DESERT NORTH

In the longitudinal valley of northern Chile is a deposit of sodium nitrate, along the inner side of the coast range on smooth land sloping almost imperceptibly eastward [Figs. 328(4) and 346]. The mineral appears as a white incrustation on loosely consolidated gravel, occurring in a bed, like hardpan, and having the general aspect of a desert ground-water precipitate. The nitrate content of this *caliche* is about 10 per cent. The bed has a thickness of four feet, more or less, and is buried under about eight feet of overburden.

**STRE.** Formerly, mining was on a small scale at several points in the vicinity. Now the district is under unified control of the Chilean-American

nitrato combine for its first *oficina* (Fig. 347). The operations of this establishment are planned systematically to embrace the nitrate area within a radius of 30 miles. Productive ground is laid out in a gridiron of rectangular strips made accessible by railway spurs terminating in portable tracks (Fig. 348).

The form of the deposit favors strip mining. A drag removes loose overburden, blasting breaks the consolidated substratum, and steam shovels load the *caliche* (Fig. 349). With 10 shovels in operation, 800 square yards of ground are mined over in 1 day, 1 acre in 6 days, 1 square mile in 10 years. Seventeen thousand tons of *caliche* are

<sup>1</sup> Field work in February, 1930, R. S. PLATT, Mining Patterns of Occupance in Five South American Districts, *Economic Geography*, Vol. 12 (1936), pp. 347, 348.



FIG. 346.—Road to Maria Elena across desert pampa. View looking southeast, the nitrate buildings on the sky line, coast range at extreme right, wires of electric power line from the coast to Chuquicamata copper mine overhead.

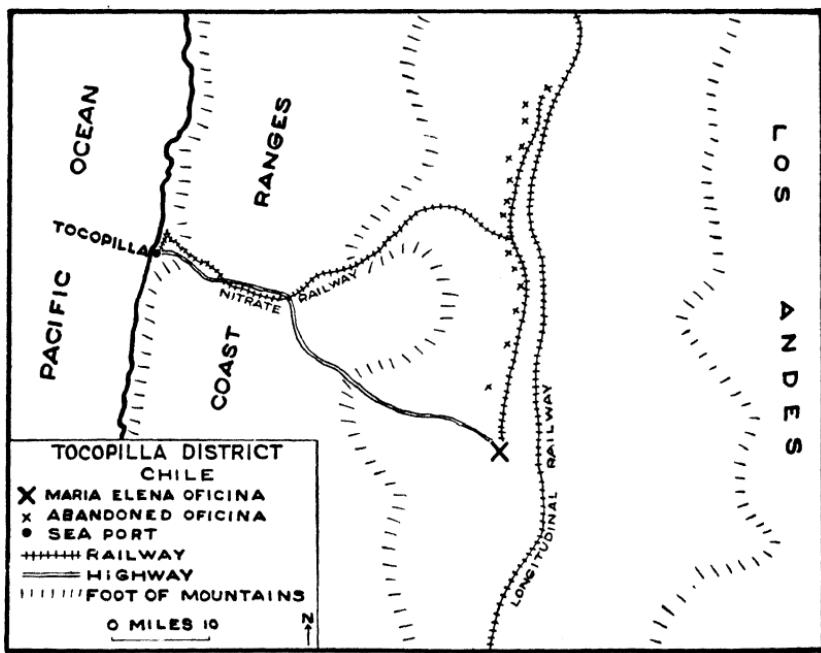


FIG. 347.—Maria Elena nitrate area and seaport.

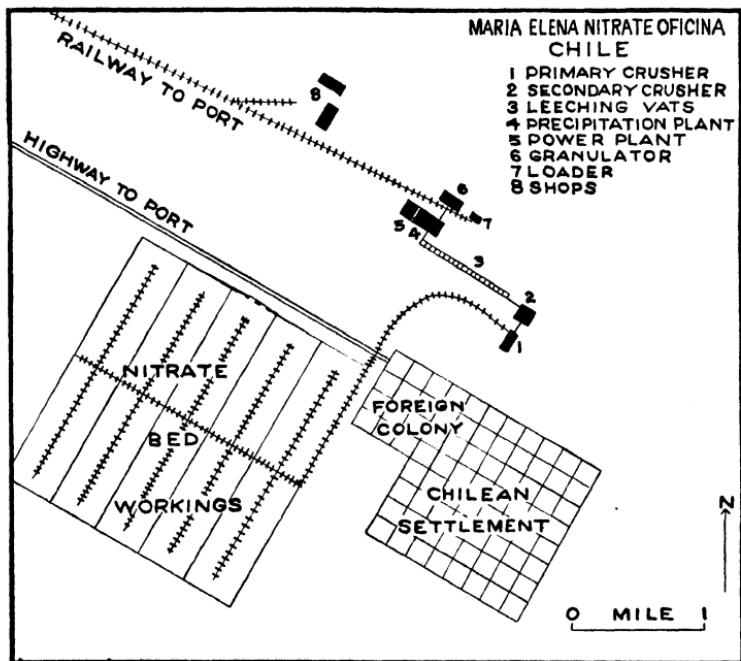


FIG. 348.—Maria Elena nitrate establishment.



FIG. 849.—Loading caliche, after stripping and blasting, Maria Elena.

hauled daily to the central plant. On the almost featureless pampa the plant appears to have been placed at random, presumably in a central location with reference to present and prospective field operations (Fig. 350). Beside it are laborers' dwellings in a spacious, regularly laid out town, and better houses for headmen, all on similar land.

The plant itself corresponds in function to a stamp mill and smelter, eliminating the 90 per cent of waste matter

unpreempted space, but also has the positive endowment of a healthful all-year climate, always fair and never enervating.

Perhaps the chief drawback is that the desert does not support plant growth and has not been subject to previous settlement. Workers come from other regions—500 laborers, mostly from Middle Chile, and a staff of 200 foreigners from North America and Europe. Food and other supplies are brought from other regions. Water



FIG. 350.—View of granulator from precipitation plant, Maria Elena. Temporary stock pile of nitrate at right.

in the "ore." In accordance with the site, movement here is horizontal rather than vertical or inclined, a circumstance not incompatible with the separative processes of solution and partial crystallization, which daily leave more than 15,000 tons of leached crushed stone on waste piles in the desert and daily recover 1,500 tons of nitrate to be exported. The pattern is not cramped for space. Its form and extent reflect development horizontally unhindered.

**SURROUNDINGS.** As for the regional circumstances, these are less unfavorable than at first might appear. The low-latitude desert pampa with an altitude of 4,000 feet not only provides

is piped from far up the Andean heights to the east. There is no available local source of power, and the largest item of importation is fuel oil from Peru and California. Extra rail haulage of oil results from location of the power plant at the *oficina* instead of on the coast, but this is paid for by incidental production of heat needed to warm the leaching fluid. The volume of all supplies coming in is small in comparison with the 1,500 tons of product daily going out. The rail route to the coast is easy, downgrade through a coast-range pass (Fig. 347). The port of Tocopilla has no sheltered harbor; but, on this low-latitude shore of year-round uniformity and few storms,

the lack of a harbor is not a serious handicap. Here the nitrate is loaded on ships bound for North America and Europe.

### 5. AZAPA<sup>1</sup>

#### AN OASIS FARM IN THE DESERT NORTH

The northern desert is a region of mining rather than of farming. Never-

theless, there is some farming in the north, and an example will serve to

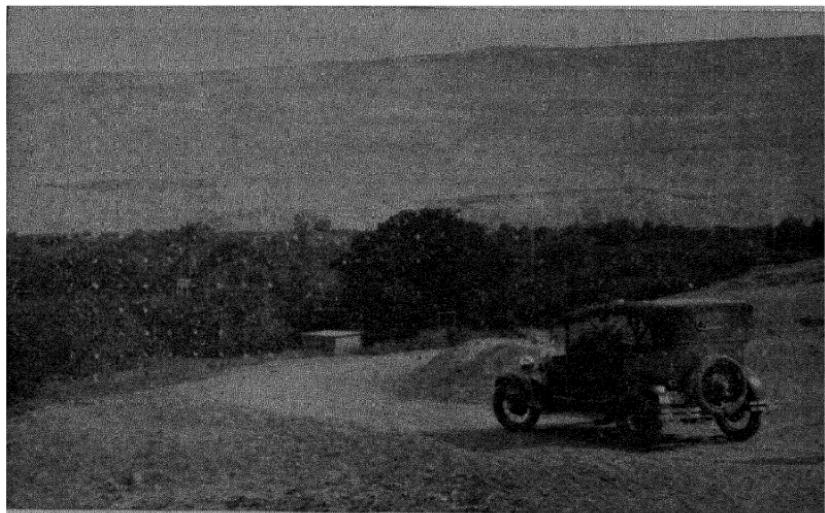


FIG. 351.—Azapa Valley oasis. Irrigation windmills visible among groves of orange and olive trees. View looking north across valley.

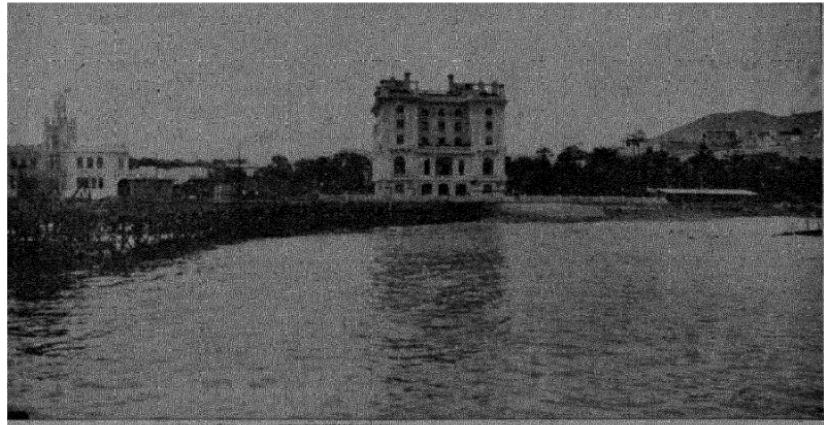


FIG. 352.—Arica, northern frontier port of Chile, at the mouth of Azapa Valley. View looking east from pier.

<sup>1</sup> Field work in February, 1930, R. S. PLATT, Items in the Chilean Pattern of Occupance, *Bulletin of the Geographical Society of Philadelphia*, Vol. 32 (1934), p. 41.

indicate some of its characteristics [Fig. 328(5)]. This one is near Arica, in a small oasis of the tropical desert (Fig. 351), utilizing water pumped by a windmill from the subsurface flow in one of the few moist valleys leading down from the semiarid Andes. Here one family makes a living on 10 acres,

producing subtropical and tropical crops (oranges, olives, and sugar cane). Tropical crops are all but excluded from Chile by aridity in the north and by frost in the south, and crops of all kinds are so nearly excluded from the Desert North that there is no want of a near-by market for food products (Fig. 352).

## 6. PIROVANO<sup>1</sup>

### ESTANCIAS IN THE HUMID PAMPAS OF ARGENTINA

This study has to do with a tract of land in central Argentina—not a

community, not a distinct district, not even a well-defined territory, but an

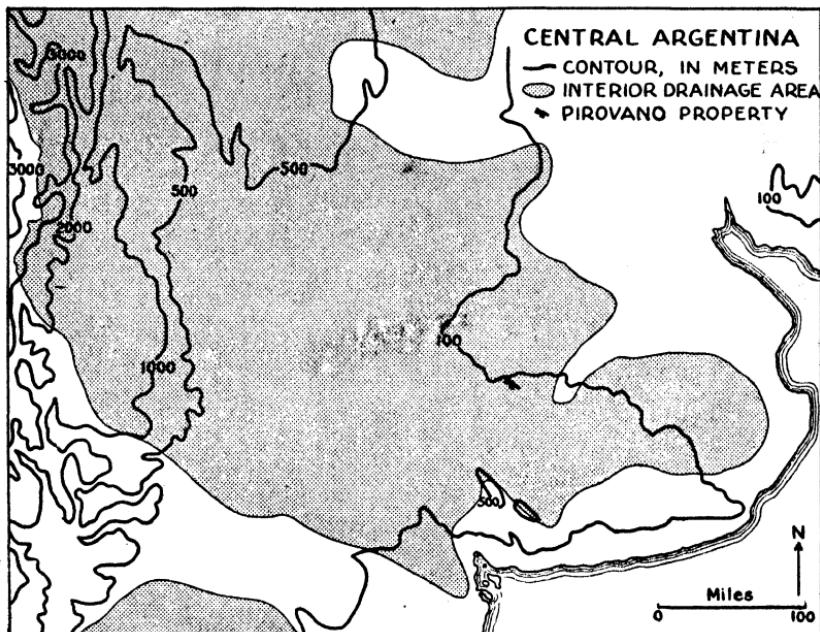


FIG. 353.—Location of Pirovano, in relation to land elevation and drainage areas. (Data from "Mapa hipsométrico de la República Argentina y Regiones Límitrofes," Dirección General de Minas, Geología e Hidrología, Buenos Aires, 1928.)

<sup>1</sup> Field work in March, 1930. R. S. PLATT, Pirovano: Items in the Argentine Pattern of Terrene Occupancy, *Annals of the Association of American Geographers*, Vol. 21 (1931), pp. 215-237.

undifferentiated fragment of a large region [Fig. 328(6)]. The choice of the area of Pirovano for study does not represent a preference for such a fragment instead of a complete unit of human occupancy but does represent exigencies of field work in a large uninterrupted region of great complexity.

to the northeast and the imperceptibly higher land to the southwest (Fig. 353). Even the fact that it lies near an apparent divide between interior and exterior drainage areas involves no perceptible contrast, the so-called interior drainage here being only a more complete lack of outflowing surface

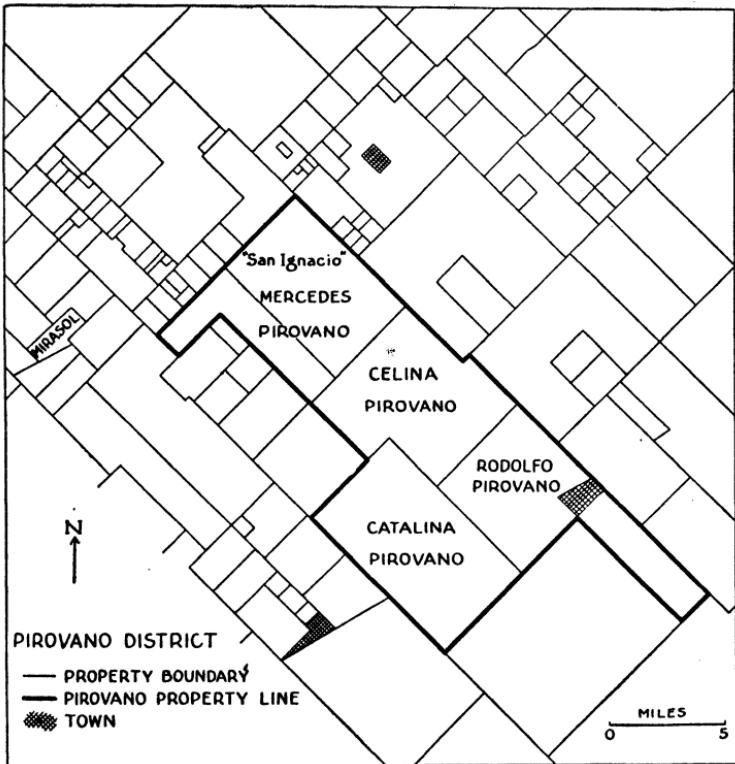


FIG. 354.—Property division in the Pirovano area.

At first glance, "complexity" may seem to be a term unsuited to describe this region, academically called the Humid Pampa or, less accurately, the Pampa, and noted for its simplicity. The Pirovano tract of land is a nearly flat and entirely undistinguished part of this extensive plain. The fact that it lies near the 100-meter contour line does not distinguish it from the imperceptibly lower land stretching away

drainage. Similarly, there is nothing critical about the line of 30 inches of average annual rainfall that passes near Pirovano or the summer isotherm of 72°F. and the winter isotherm of 49°.

Thus Pirovano is in an area of uniform conditions, not only called "simple," but generally called "monotonous." Sixty years ago this was grassy pampa, free Indian hunting ground. Today it is no longer "pampa."

in the true sense of an unwooded, unfenced, untilled plain. A transformation has taken place since 1875, involving the area in a new and complex pattern of occupancy.

**OLD RANCH.** The transformation began with the driving off of the

in the vicinity of Buenos Aires, near the northwest- and southeast-trending shore of the Rio de la Plata or the Rio Salado, and extended farther inland to form successive properties of various sizes and convenient rectangular form on the unbroken plain

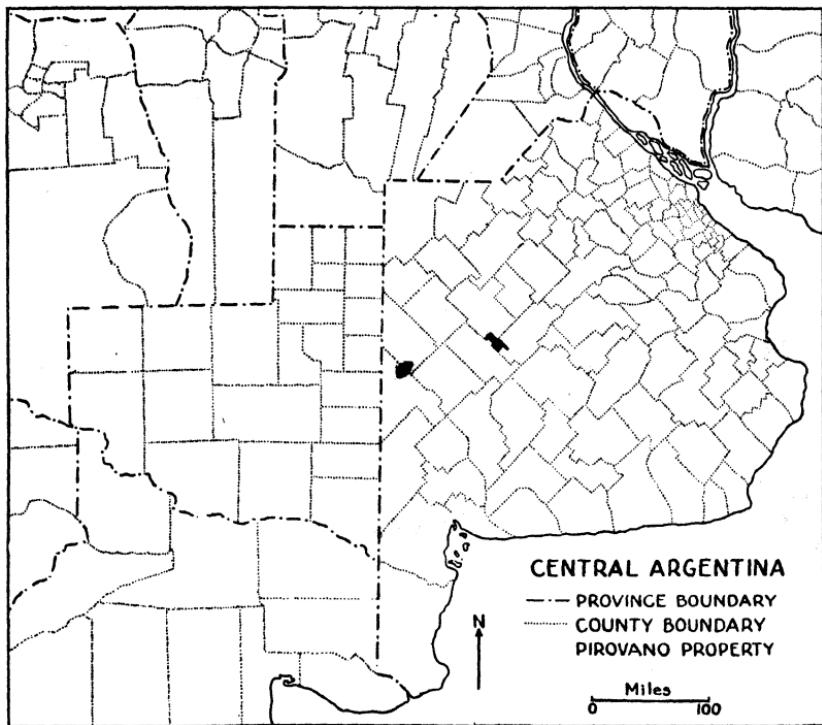


FIG. 355.—Local political divisions in the province of Buenos Aires and adjacent areas.  
(Data from maps of Ministerio de Agricultura de la Nación, Buenos Aires.)

Indians and the distribution of property rights in the land. A tract of 100,000 acres was presented to a surgeon of Buenos Aires. In form and size, this tract befits the general setting. The size reflects generous allotment for establishing a rural seat with land for livestock, made by a nation having abundant unappropriated land and a few favored citizens. The form of the property reflects the carrying out of a random system of survey, begun

(Fig. 354). This orientation of landholdings in the province of Buenos Aires is suggested by the map of minor political divisions in which generally the boundaries follow property lines (Fig. 355).

The Pirovano property was used during the lifetime of the first owner in the way intended, the best way practicable before extension of railways to the district. Herds grazed on the unfenced grassland, and a house

was built as a country residence, surrounded by newly planted trees on a slight undulation in the plain near the most accessible corner of the property. The pattern of occupancy was still simple, in accordance with the simplicity of the natural setting.

**NEW RANCH.** After the death of the first owner in 1906 the property was divided among his four children, a suitable procedure in view of its more than ample size, 25,000 acres for each

cattle; a group of buildings in a sheltering grove of trees has become a central focus for the establishment; new transportation facilities and marketing arrangements have drawn the *estancia* into a regional organization accepting a regional opportunity for export beef production (Figs. 356 and 357).

The pattern of the *estancia* conforms to the natural setting in the new way. The plain can support better fodder than that afforded by the natural



FIG. 356.—Estancia La Celina. View looking south from a corral near headquarters. Steers in pasture; fenced and planted fields extending over the horizon.

share. The son received the part containing the original house, and the three daughters other parts (Fig. 354). Since the formation of these four units the pattern of occupancy has attained complexity. In all four, there have been changes, coincident with developments involving the whole region of grassy plains.

The Estancia La Celina shows less change than the others. Here cattle still occupy the stage to the practical exclusion of other interests. Yet there is little similarity to the cattle establishment of 35 years ago. Fenced and planted fields have replaced the open grasslands; steers dominantly of Short-horn blood have replaced the criollo

grasses, capable of bringing more cattle more quickly to better condition.

Planting of fodder and control of herds induce division of the land into fenced fields. The orientation of these fields follows that of the old property division. Their form is indicative of convenient subdivision with a regularity favored by the uniformity of the plain. Their size indicates the use to which the land is put. To avoid an excess of fields and fence lines the divisions are made as large as is consistent with efficient use, for pastures grazed evenly and not neglected in far corners, and for units of cultivation. Accordingly, most of the land is in fields of near the maximum size

admissible, about one thousand acres. In addition, some smaller fields are needed for handling small groups of livestock, particularly around the headquarters of the *estancia*. There are no streams or lakes, and water for each field is provided by a windmill and storage tank.

with other crops is needed. (2) Alfalfa pasture is excellent in the moist mild weather of spring and autumn, but inferior in midwinter cold and midsummer drought. Accordingly, other fodder crops are needed. (3) Alfalfa occasionally is killed out by frost or drought, and a catch crop is needed.

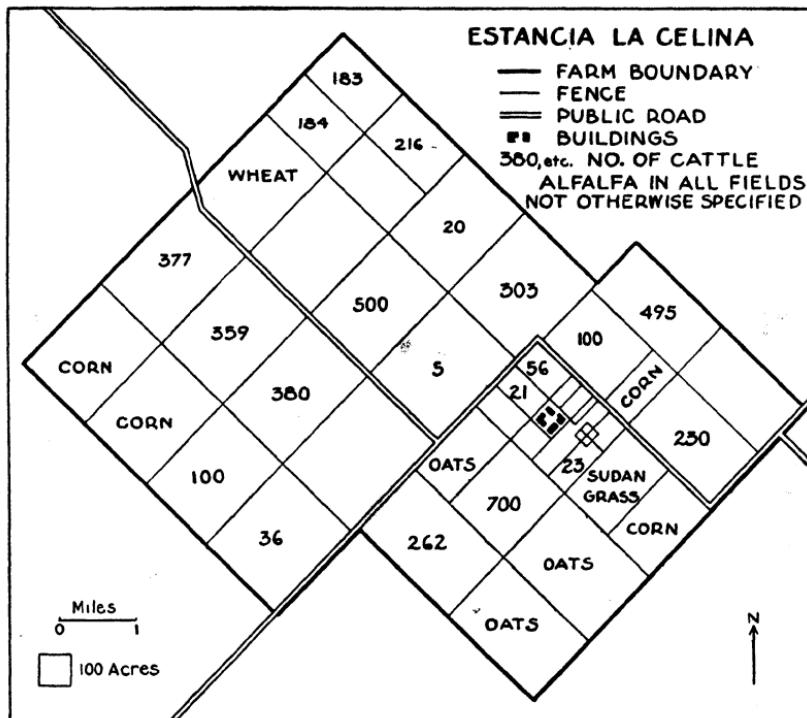


FIG. 857.—Crops and cattle in La Celina.

Of the several crops in the fields, alfalfa is the pivotal one, growing luxuriantly in this land with its fertile sandy loam and its ground water within 15 feet of the surface. No other plant available in the district can equal it in economical production of high-grade beef. Accordingly, alfalfa always occupies most of the fields. But it cannot occupy all the fields all the time for three reasons. (1) Alfalfa runs out in about 5 years. Therefore, rotation

Therefore, some fields are occupied by corn, a good fodder crop and a good successor to alfalfa in rotation; others by oats, good green pasturage in winter and grain fodder thereafter, as well as a suitable successor to alfalfa in rotation; another by Sudan grass, good summer pasturage; and another by wheat, a good grain crop.

Unequal distribution of cattle from field to field is characteristic, on account of variety in the condition of

pastures and the requirements of animals. The map (Fig. 357) shows 4,640 cattle, less than 1 in 5 acres, fewer than normal, due principally to curtailment at a time of market depression. The capacity is about double this number.

The number is adjusted promptly to market and other conditions, for the cycle is short. The *estancia* is a fattening establishment through which passes a stream of steers, arriving at two years

Celina; but financial difficulties have come upon all three, with attendant changes.

Of these three, San Ignacio is the best example of departure from the type represented by La Celina (Fig. 354). After division of the original property, the owner of the quarter named San Ignacio selected a site for his house and gardens in his 25,000-acre expanse of treeless plain. The site chosen was a strip of low dunes, not

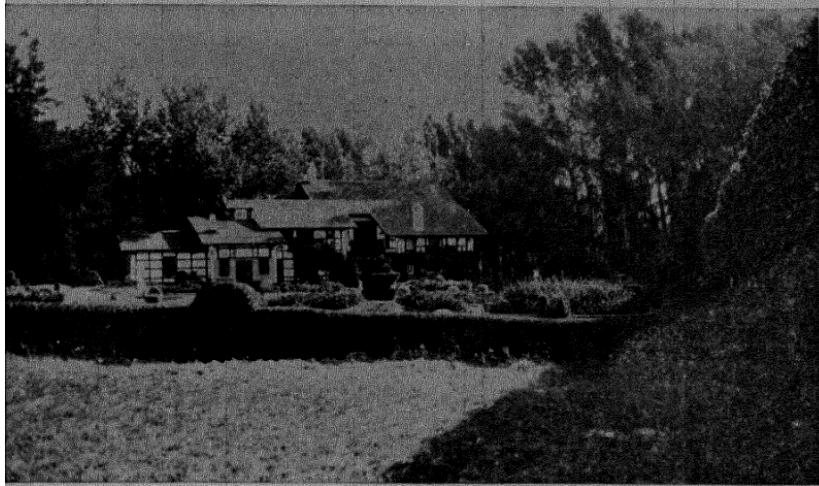


FIG. 358.—Owner's house in the *monte*, Estancia San Ignacio.

of age, kept 6 to 12 months, and then sent to market. The fodder is so good for fattening that it is not economically used for breeding, and the animals are reared to the fattening stage in grasslands, farther west where the climate is too dry and farther east where the soil is too heavy for alfalfa.

La Celina is efficiently operated and financially successful. The owner, son-in-law of the first owner, is a keen businessman of Swiss origin.

**FINE ESTATE.** The other three *estancias* carved from the original property have been in the hands of other heirs. The land is similar, and, at least until recently, the system of operation has been similar to that of La

standing out conspicuously but at least offering a slight variety of surface.

In the spot chosen, landscape planting and building have made a fairyland of 250 acres. More than forty kinds of trees are thriving here, chiefly middle-latitude shade trees, of which common varieties of eucalyptus and poplar have proved most satisfactory, with also a few conifers, and some fruits—figs, peaches, apples, pears, and quinces. For all the trees and shrubs, seedlings are raised under irrigation in a nursery and are watered for 2 years after transplantation.

In the midst of this *monte*, woodland, the buildings are more or less hidden from each other—dwellings

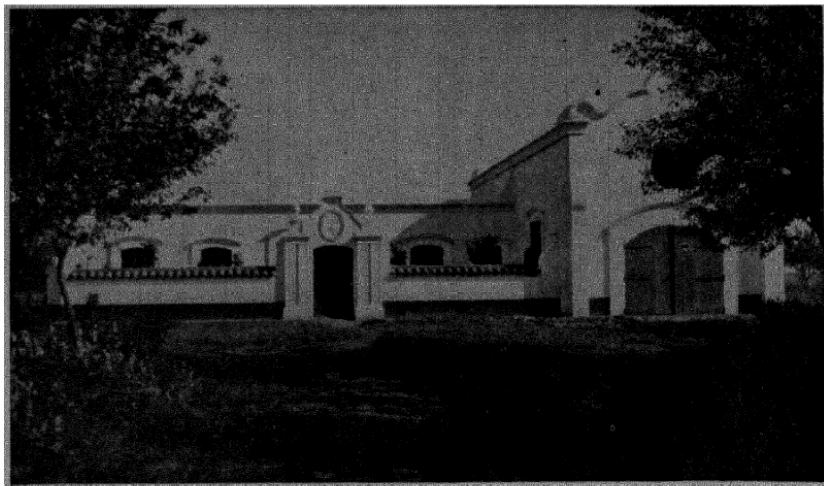


FIG. 359.—Blacksmith shop and granary in the *monte*, San Ignacio.

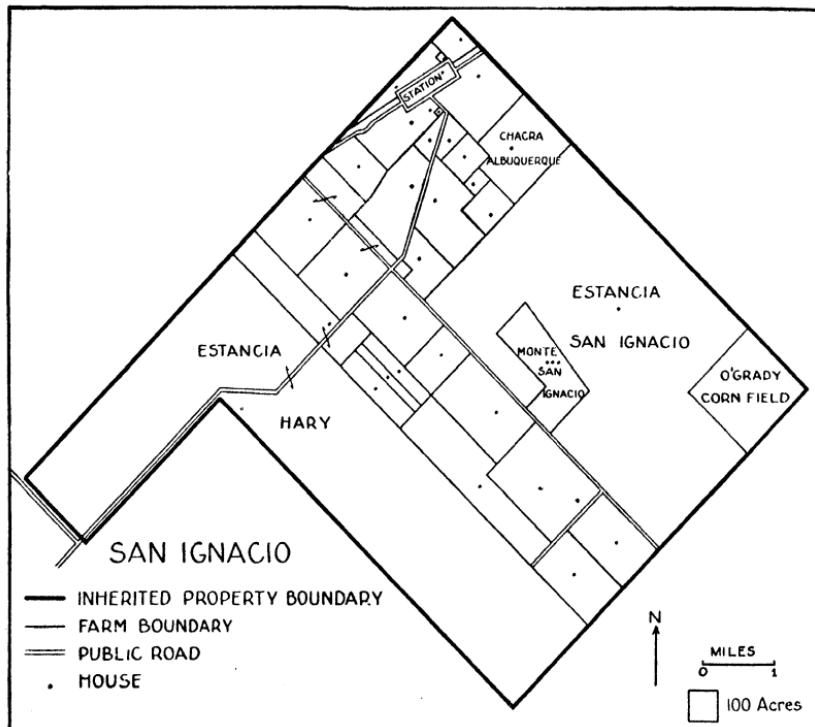


FIG. 360.- Subdivision of San Ignacio into small farm units.

for the owner (Fig. 358), manager, caretakers, servants, and field laborers, stables, garage, electric plant, granary, blacksmith shop (Fig. 359), chapel, and other buildings. Also, there are tennis

Their attention has not been centered on the *estancia* of San Ignacio as a productive enterprise. The establishment has been managed skillfully by a shrewd and honest Scotchman.

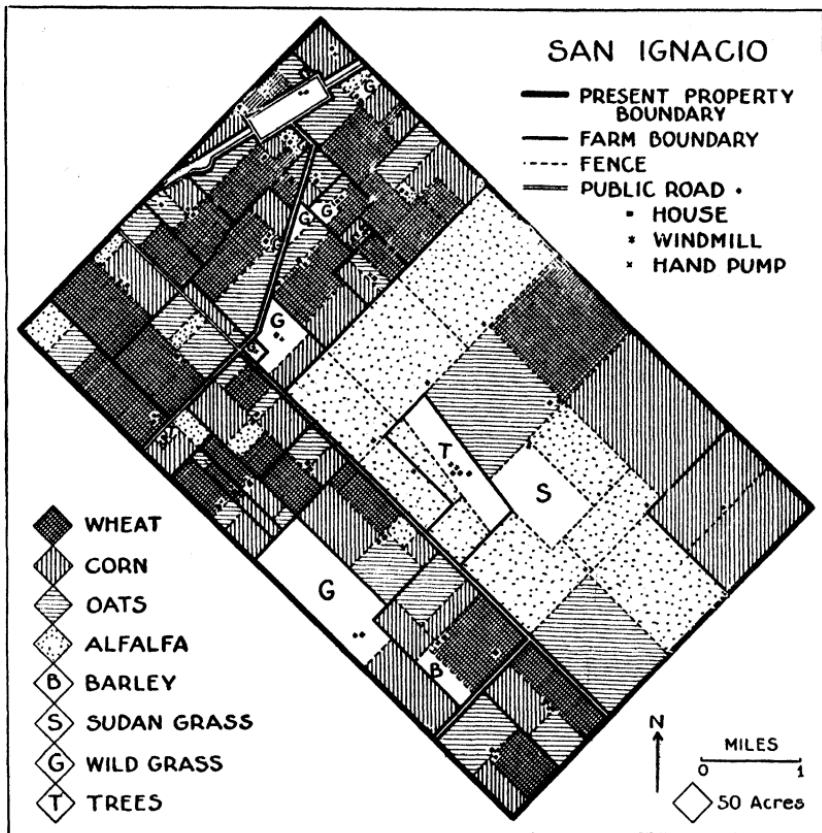


FIG. 361.—Crops in small farm divisions of San Ignacio.

courts, golf links, and swimming pool, all well-planned and well-kept.

Here the owner's family has spent about five weeks during the year, generally in early autumn. They have had four other places of residence: a mountain house in Córdoba for the spring, a seashore house at Mar del Plata for the summer, and city houses in Buenos Aires and Paris for the winter.

But financial demands have exceeded the productive capacity of the *estancia*. Consequently, changes in San Ignacio have extended beyond the exotic group of buildings among the trees to the other 99 per cent of the land of the *estancia*.

A tract of 8,000 acres has been sold to form the separate Estancia Hary, devoted to alfalfa fields and cattle (Fig. 360). Another tract of 10,000

acres has been divided into 28 small farms (*chacras*) rented to tenant farmers.

**SMALL FARMS.** In their orientation and form the small farms show the

to which cattle can be brought for fattening but as fertile soil to which labor can be applied for crop production. Even the largest *chacra* is smaller than individual fields in the *estancias*.

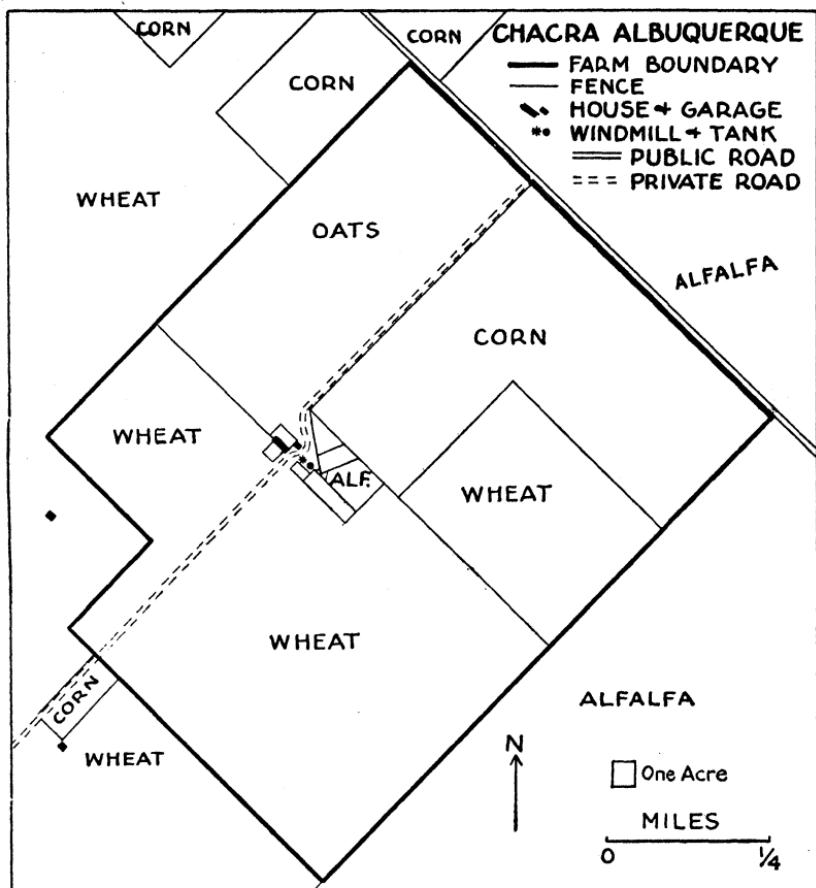


FIG. 362.—Land use in one of the small farms of San Ignacio.

same tendencies as the larger divisions, their boundaries drawn to parallel property lines and to form rectangles of miscellaneous sizes (Fig. 360). They are obviously on a smaller scale than either the old property divisions or the modern *estancias*, reflecting a different sort of land utilization. Here the land is considered primarily not as pasture

All are within the limits of size suitable for single-family agricultural units, from the largest of 700 acres, which strains the working capacity of a large family, to the smallest of 20 acres, which affords a precarious living to one poor worker.

In their turn the *chacras* are subdivided into fields (Figs. 361 and 362).

Unlike the great *estancia* pastures, which seem to occupy the landscape unbounded as far as the eye can see, these smaller divisions are encompassed by a glance and by reason of mere size produce marked contrast in the pattern of occupancy. The fields are less uniform in size than the main subdivisions of the *estancias*, for small *chacras* as well as large ones need several field divisions. Accordingly, there is a rough conformity between the size of a *chacra* and the size of its fields; unlike the *estancias*, in which commonly the total amount of land is so many times greater than the maximum size suitable for fields, that larger farm area is reflected not in larger but in a greater number of fields.

Even within a single *chacra* some inequality in size of fields is characteristic, owing to unequal space requirements among the uses to which fields are put. Moreover, *chacra* fields are not permanent enclosures, but are changed from time to time in response to changing needs, by moving the light wire fences, in contrast with the *estancias*, where large and similar fields are permanently set off. Nevertheless, *chacra* fields repeat the familiar orientation and rectangular form.

The objective in this subdivision of *chacras* is to provide for the growing of several crops, partly because some rotation is needed to maintain crop yields, partly because no one crop supplies all needs, and partly because some consideration is given to pasturage for livestock.

Among the crops, wheat is prominent, occupying 45 per cent of all *chacra* land and much of the same land 2 or 3 years in succession in spite of smaller yields (Figs. 361 and 362). To a greater degree than any other available crop, it combines easy and quick production and marketability, sufficient recommendation among tenant farmers lacking in capital and operating on a narrow margin of possible earnings and of agricultural knowledge.

Straw piles are the most conspicuous features of the landscape.

Along with wheat, oats and corn are included in almost every *chacra*, each occupying about 20 per cent of the land, each planted in irregular rotation with wheat, and each providing grain partly for market and partly for supply. Oats are superior to wheat for winter pasture and grain fodder and for yield in depleted soil but are less profitable as a market crop. Corn is superior in its high yield of grain for food and fodder and fits well into rotation and labor distribution but is inferior as an export crop, not drying thoroughly in the cool moist autumn as does the corn grown farther north in the adjoining province.

In most of the *chacras*, no other field crop finds a place, although rotation might seem to suggest the desirability of alfalfa. The difference in the point of view of the *chacra* as compared with that of the *estancia* is illustrated by the fact that in the few tenant farms where alfalfa occupies more than a barnyard pasture lot it is at least partly in the guise of a grain crop. In these cases, alfalfa seed is harvested and finds a good market farther north in warmer parts of the alfalfa region.

The alfalfa fields belong to exceptionally progressive tenant farmers. Exceptional in another way are a few fields of wild grass that might be thought to be pasture (Fig. 361). But less than in the case of alfalfa do these fields represent a primary interest in livestock. They are evidence of exceptional neglect, perhaps temporary failure to plant a crop, and are practically idle land.

After what has been said of the emphasis on grain farming, it may seem surprising that the livestock density per square mile in the *chacras* is almost as great as that in the *estancia*. This might be considered contrary evidence on *chacra* development. But for the most part the livestock represents easy expediency rather

than foresighted policy and is not managed in a way to contribute much to the farm economy.

Horses are most abundant, five times as numerous as cattle (Fig. 363). Some are needed for field work and draft purposes, but the number is in excess of these needs. This results from the fact that horses are obtained easily and breed and increase freely and have no market. Their presence indicates an abundance of incidental fodder—stubble fields, young oats, patches of pasture, and surplus grain—fodder

The *chucra* pattern is incomplete without its central focus of activities. Commonly the farmhouse is in the center of the farm, without reference to the slight undulations and depressions of the plain and to bordering roads (Fig. 362). Apparently, it is placed with reference to the well, which in turn is sunk near the center for convenient access from all quarters at the junction of the several fields. Shallow wells and short windmills are favored by wind and water. In all cases the dwelling is an insignificant

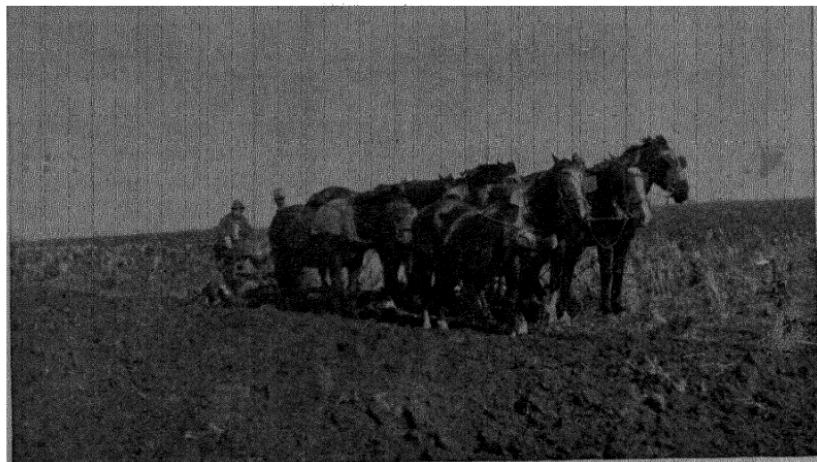


FIG. 363.—Tenant farmer plowing a wheat field, San Ignacio.

that might possibly be used for marketable animals.

Even the less numerous cattle do not fill a very useful place. Most of them are scrub animals—cows giving little milk and calves growing up slowly to produce inferior meat, eating their full share of fodder.

In the use of livestock, two or three *charcas* are exceptional, not breeding scrub stock but buying and fattening steers for market. These establishments are among the few that include alfalfa in their system of grain production. They are unusually prosperous, comparable in this respect with La Celina among the *estancias*.

structure built of mud (Fig. 364). Around it are corrals, but no other buildings, no shelter for livestock, or harvested crops, or farm machines. Rain and wind in every season and frost occasionally in winter are not sufficient reasons for large barns even on the *estancias*, to say nothing of the tenant farms. Animals graze throughout the year, bagged grain is covered with canvas, and farm machines stand outdoors.

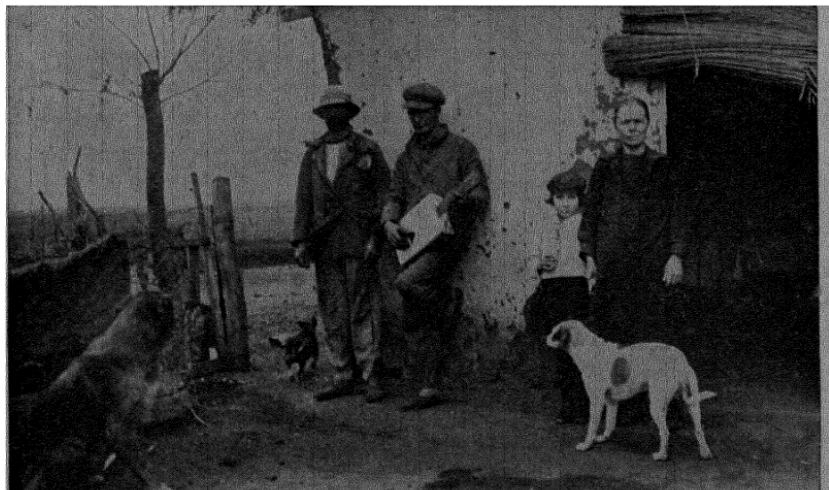
It is not in buildings but only in machines that there is evidence of capital investment. All the *charcas* are well-equipped with North American implements, reflecting needs en-

countered in new country where small families are tilling large fields, and

in the *chacra* system are natural accompaniments of temporary land



**FIG. 364.**—Tenant farmstead, San Ignacio. A mud house with corrugated iron roof, in a patch of thin young shade trees in the midst of fields. The well is beyond the left margin of the picture. There is no other building, and no shelter for farm machinery, harvested grain, or livestock.



**FIG. 365.**—The Widow Albuquerque with son, daughter, and hired man, Chacra Albuquerque.

met opportunely by implement sales promotion.

The lack of fixed improvements and the common lack of foresighted policy

tenure by inexperienced farmers and of high expenses with a narrow margin of profit. The people are immigrants, most of them from Spanish Galicia.

Land rents and high prices for supplies consume so much of the income from unskillful farming that savings are small and debts are common. It is noteworthy that these farmers and their system fit even tolerably well into their environment (Fig. 365).

been released as an *estancia* to a successful druggist from a near-by town.

**HOG FARM.** The last field to be accounted for, 800 acres, has been leased to a North American businessman of Buenos Aires who owns another

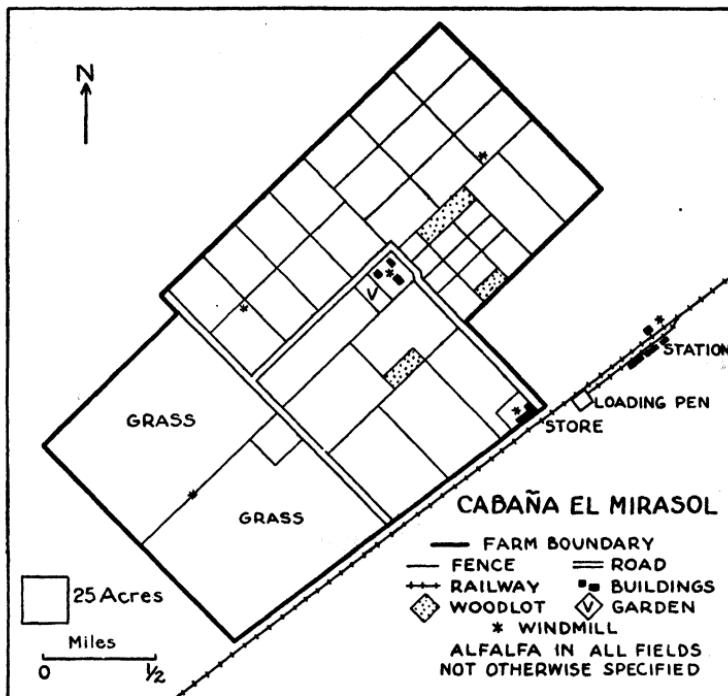


FIG. 366.—Land use in a hog farm.

The owner of San Ignacio, after disposing of the Estancia Hary and the rented *chacras*, retained direct control of a tract of 7,000 acres surrounding the *monte*. This residue has been managed as an *estancia* like its larger predecessor. But continuance of the financial strain has led to alienation of this residual *estancia*. An arrangement made under bank supervision has left only the *monte* and a small adjacent field in the hands of the owner, for residence purposes. The bulk of the land, 6,000 acres, has

farm near by (Fig. 360: O'Grady cornfield). He has had the field planted in corn to finish the fattening of hogs. This field is therefore part of another kind of enterprise, a hog farm. The main part of this enterprise is the Cabaña Mirasol, of 2,000 acres, formerly part of a cattle establishment, purchased five years ago for development as a hog establishment (Figs. 366 and 367).

The place is a tract in the same plain, similarly oriented and divided. Old fields of cattle-pasture size have been

subdivided into fields small enough for controlling swine, separated by tight wire fencing. Two outlying fields containing a strip of low dunes have been left undivided and in wild grass as pasture for the farm horses. All the other fields are in alfalfa, a temporary situation, due to the newness of the establishment. Other crops will succeed alfalfa in a few years. As pasture for swine, alfalfa lasts longer than for cattle, owing to more reseeding.

3,000 hogs fattening there represents the semiannual output of Mirasol.

Because the farm is a business venture and not a countryseat, the central focus contains only a manager's house, laborers' quarters, and a small storehouse.

**TRANSPORT NET.** The marketing of Mirasol hogs as well as *estancia* cattle and *chacra* grain is accomplished through a system of transportation and focal facilities spreading over the



FIG. 367.—Pigs in alfalfa pasture, Cabaña Mirasol. Manager at left, veterinary doctor on periodic visit at right.

The small fields are not all provided with wells but are supplied by a tank wagon moving between the four windmills and numerous field tanks.

In each of the 20-acre fields, there are 25 sows and families of six or seven pigs. The breeding and fattening of swine belong in the same district, unlike the rearing of beef cattle, in which the long breeding period on grassland belongs in a different district from the short fattening period on alfalfa pasture. Nevertheless, the swine, unlike cattle, require grain in addition to alfalfa for fattening. Therefore the cornfield is leased in San Ignacio, and

region and tying a great area into a unit of commercial production. Interpretation of the intricate pattern of this system is beyond the scope of this rural study.

Even of the local road pattern little can now be said except that it follows the orientation of property lines and gives access to all the homogeneous area rather than direct connection between focal points (Fig. 368). The only through roads are those alongside railways, weakly supplementing the through rail lines, which connect the focal points at railway stations with the outside world. The uniformity of

the land and lack of rural concentrations are suggested again by the spacing of railways and the placement of stations regularly 12 miles apart (with occasional exceptions like the extra

Clearly the rural pattern of a small district is complex apart from urban complications and apart from differences from place to place in the so-called Pampa region. The simplicity of

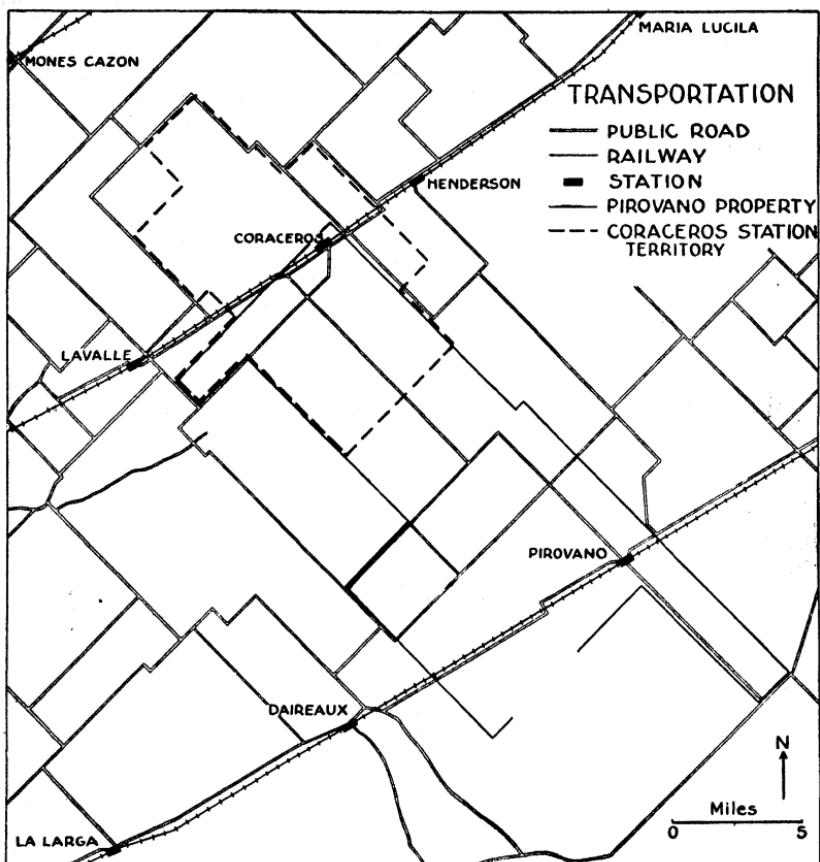


FIG. 368.—Pattern of transport in the vicinity of Pirovano.

station of Coraceros inserted because of private influence at San Ignacio) (Fig. 368).

The railway pattern of the region suggests again homogeneity within a certain area, and the function of giving all included districts access to great regional foci (Figs. 330, page 333 and 369).

the Pampas has vanished. Complexity has been born not only of variety in the land but of uniform richness, allowing success in a multitude of ways within a small area. Doubtless the present complexity is unstable: *estancias* are being subdivided, *chacras* are temporary. Perhaps one sort of land use may supersede all present

competitors for the land, and uniformity may be established over a large area. Yet this will be not the old

simplicity of the Pampas, but a complex uniformity rooted in present intricacies of the pattern of occupancy.



FIG. 369.—Water front of Compañía Swift Internacional, La Plata. A British ship alongside to load beef. View looking east on the north side of the plant. Livestock trains from the *estancia* area enter the west side of the plant.

## 7. CABO CORRIENTES AND CHAPADMALAL<sup>1</sup>

### COASTAL ESTANCIAS IN THE HUMID PAMPAS

The outermost cape of the Argentine coast is on the periphery of the central region; yet it has developed as a part of the interior, reached by an overland journey from the northeast coast and only recently opened to secondary access through the port of Mar del Plata [Fig. 328(7)]. Its pattern and stage of development are like those of inland parts of the province.

The pattern of property division almost duplicates that of Pirovano (Fig. 370). The orientation is that of the distant northeast shore, the straight lines and right angles are those of the featureless plain, and there are both large properties of the old *pastoral* era and small properties of agricultural settlement.

**DAIRY ESTATE.** Two large properties exemplify the pattern of occupancy. Estancia Cabo Corrientes carries the name of its ocean promontory. How sharply the Argentine plain meets the sea without intervention of other land forms is suggested here where smooth farmland extends uninterrupted to the lighthouse at the water's edge, even on this most prominent cape of the long coast (Figs. 371 and 372). Cabo Corrientes marks the place at which a low ridge formed of underlying limestone succeeds the almost flat alluvial lands extending southward from the Paraná and Rio de la Plata. Thus the land of the *estancia*, like that adjoining it on the south and inland from this

<sup>1</sup> Field work in April, 1930. R. S. PLATT, Peripheral Items in the Argentine Pattern of Terrene Occupancy, *Transactions of the Illinois State Academy of Science*, Vol. 24 (1931), pp. 414-417.

point, is an undulating upland with rock but a few feet beneath its silt soil.

The *estancia* has an area of 18,000 acres, with a seashore frontage of 4 miles. It was founded fifty years ago as a grazing establishment (Fig. 373) and has continued so until recently. Now the rise of new opportunities has led

intensive and soil-depleting crop of potatoes.

The remaining 6,000 acres of the *estancia* have been kept intact by the Argentine owner to form a dairy establishment with a total of 2,600 cows. The land is less suitable for alfalfa than are those of the western

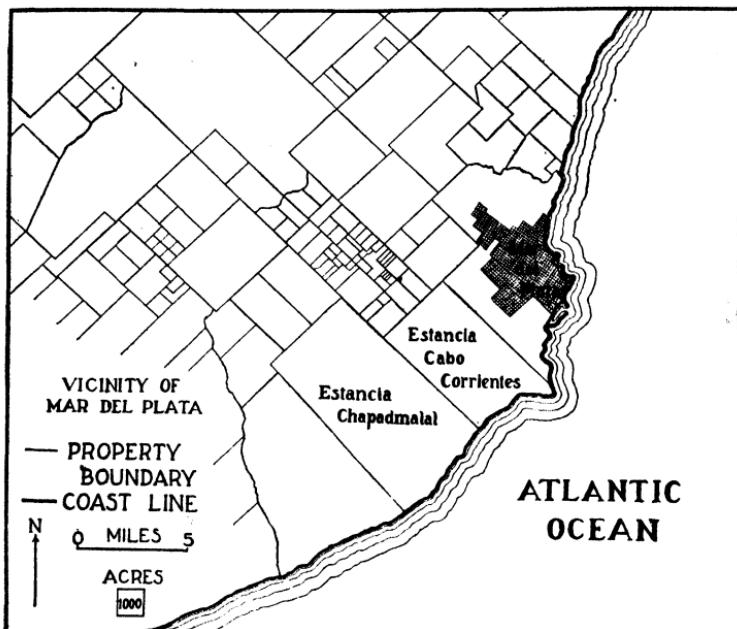


FIG. 370.—An area of about nine hundred square miles in the vicinity of Mar del Plata. Pattern of property division, including some large *estancias* and some small subdivisions.

to changes. The soil and climate are good for agriculture; and, under the market stimulation of the town and new port of Mar del Plata, 12,000 acres have been subdivided into small farms and rented to immigrant tenants. The larger of these subdivisions are grain-growing enterprises, in some cases a single farm occupying one of the old *estancia* pasture fields, with 1,200 acres as a maximum size. Wheat and oats, some barley, and a little corn are grown for market. Smaller tracts, commonly 120 acres, are rented for the more

interior of the region with their lighter soils and higher water table; but the natural grass is good pasture, and other available plants make excellent fodder for cows. The establishment has been organized into seven dairy farms, to eliminate the difficulties of inconveniently large herds and too extensive tracts of land (Fig. 371).

The dairies are not all of the same size, but a typical one has 350 acres of land, 125 cows, and seven men. The only dairy building is a house for the men; the milking pen and water tank

complete the dairy headquarters. The cows remain in pasture throughout the year. Because the natural grass is less efficient for milk production than selected pasture plants and is particularly poor during winter cold and

The dry cows, which need not be kept at the dairies on special fodder, are segregated elsewhere in large pastures of natural grass (Fig. 372).

The *estancia* specializes in providing fresh milk to the Mar del Plata market,

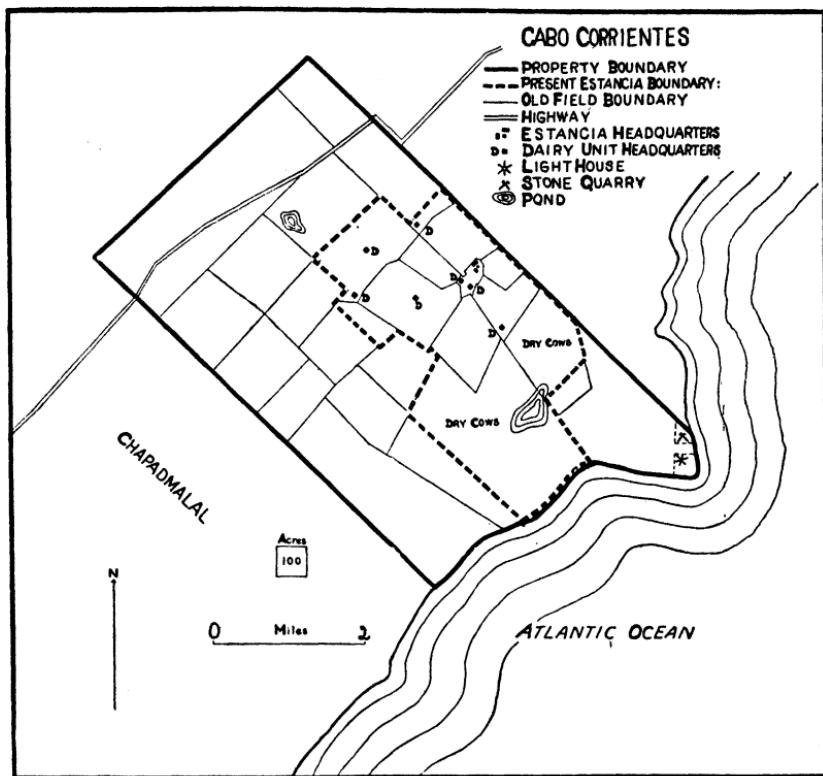


FIG. 371.—Farm units within a large property unit, Estancia Cabo Corrientes. Not only are the "dairy units" organized as separate farms, but also other "old fields" of the original *estancia* property are now used as tenant farms. In the vicinity of Mar del Plata, Fig. 370.

summer drought, more than half the land allotted to each dairy, adjacent to headquarters, is planted pasture. A mixture of barley, rye, and oats is particularly good for winter pasture, and corn provides green summer fodder. The planted land is divided into six fenced fields, of an average size of about forty acres, each used for about two months during the year.

thus taking advantage of proximity to the city and of high-grade production methods. Calves are not kept for fattening, but heifers are reared to replenish and increase the herds.

The establishment is a profitable enterprise and is expanding steadily over more of the old *estancia* property, displacing some of the small tenant farmers who hold leases for only one

or two years. Thus apparently befitting its natural setting, this new use of the old *estancia* shows evidence of stability.

tes, in the same undulatory, fertile plain, originally grass-covered and long used for extensive grazing. Of the



FIG. 372.—Natural grass pasture, Estancia Cabo Corrientes. View looking eastward toward the lighthouse and seashore.

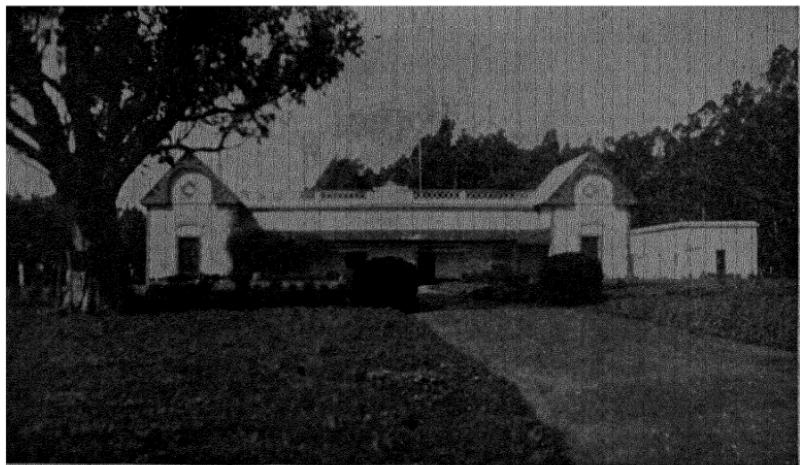


FIG. 373.—Old *casa grande* of Estancia Cabo Corrientes, built in the time of cattle ranching, about 1880.

**STOCK FARM.** Further illustration of land occupancy in the district is provided by the neighboring property of Chapadmalal, probably the most famous *estancia* in Argentina (Fig. 374). The land is like that of Cabo Corrien-

30,100 acres contained in the old *estancia*, 17,800 have been subdivided into small farms and leased, as at Cabo Corrientes, the remaining 12,300 acres being kept intact to form the present *estancia*.

It is not the land but the type of activity here engaged in that has distinguished the establishment. Chapadmalal has been developed by its Argentine owner for the breeding of

bluegrass, and clover. For winter pasture, 1,200 acres are planted in oats. The number of animals is only a little larger than at Cabo Corrientes, although the amount of land and the

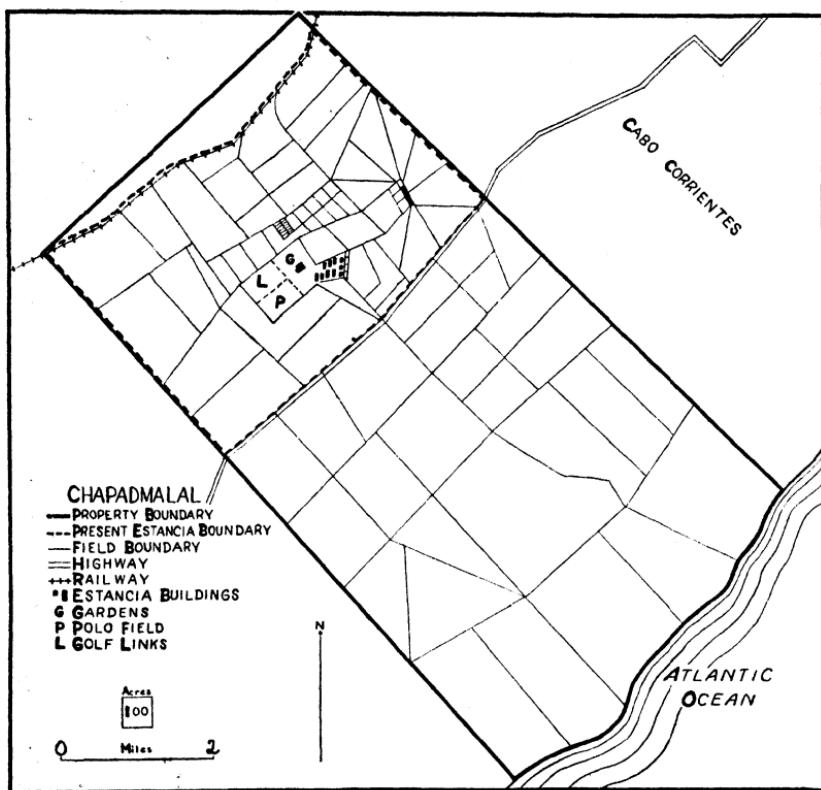


FIG. 374.—Fields used in the active *estancia* of Chapadmalal, and fields of the original *estancia* property now used as tenant farms.

fine livestock, pedigreed bulls and race horses (Fig. 375). Ordinary beef steers, 2,000 or more in number, occupy large outlying pastures of natural grass, but chief attention is given to the less numerous but far more valuable pedigreed animals. These are carefully attended, pastured in small planted fields, and housed in stables (Fig. 376). For pasturage, 2,900 acres are planted with mixtures including rye grass,

number of workers, 120, are twice as great.

The *estancia* sends many winners to livestock shows and horse races, selling its output at premium prices and maintaining a high reputation in a country where livestock is greatly esteemed. But it has been a costly venture, marked by considerable extravagance, so that it has passed under the control of creditor banks

(Fig. 377). Probably there will be changes of policy, but in general the establishment seems to be of a type

fine breeding establishment, as well as for some beef cattle and some dairy establishments and farms utilizing the



FIG. 375.—Pedigreed mares in planted pasture, Estancia Chapadmalal.

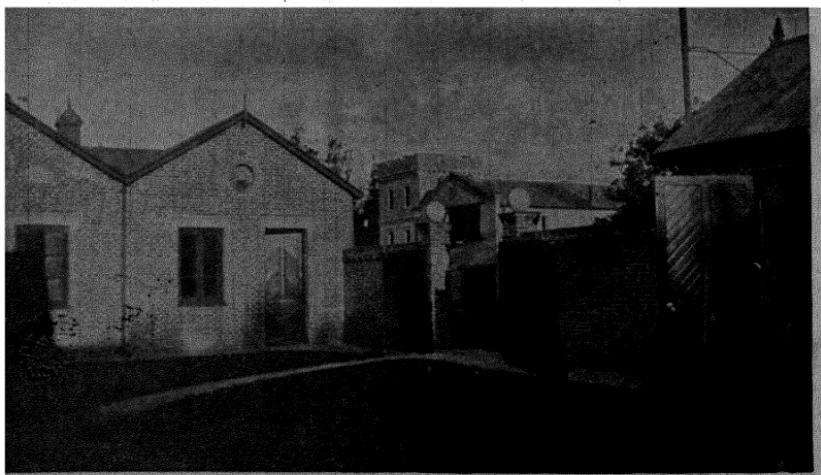


FIG. 376.—Stables for pedigree cattle and horses, Estancia Chapadmalal.

befitting its natural setting, fulfilling successfully a special need of national significance, and enjoying the advantage of an established reputation.

Apparently, there is a permanent place in the district for at least one

soil for agriculture. This suggests some approach to stability. Near Mar del Plata, changes have been slighter than at Pirovano from the livestock grazing of the original occupancy to the grazing of the present, part of it

still on the natural grassland. Here, apparently, stability after less change accompanies less richness of opportunity. Because the soil is unsuitable for alfalfa and less outstandingly produc-

tive for other crops, although supporting excellent grass pasture, there is no strong incentive for final change to intensive forms of agriculture and livestock fattening.



FIG. 377.—Owner's house, having the style, dimensions, and furnishings of an English castle, Estancia Chapadmalal.

## 8. ZAVALLA AND ROLDÁN<sup>1</sup>

### IMMIGRANT FARMS IN THE HUMID PAMPAS

In the central farming region of Argentina the superposition of multiformity of activity upon uniformity of environment is based on uniform richness in the fertile plain, allowing success in various productive enterprises, easy success of one sort at the start and alternative opportunities for success in later stages of development.

The smooth rich plain extends to the very shore of the Paraná, which here bounds the region [Fig. 328(8)]. The land is, if anything, richer than that of Pirovano in the interior—the soil is more fertile, the rainfall more plentiful, the growing season longer, the winter milder, and the location close to the

great port of Rosario is superior. No wonder that this area, settled earlier and more densely than the inland parts of the region, is now somewhat more advanced in its development.

The subdivision of property has progressed far (Fig. 378). The great *estancias*, originally established as units of extensive grazing on the grassy pampas, have all but disappeared. Even large properties that have not been divided in ownership are no longer functional units but are generally subdivided into tenant farms. Thus the present pattern of land division reflects organization of the area for cultivation of the soil in farms

<sup>1</sup> Field work in April, 1930. *Ibid.*, pp. 410-414.

of a size to be operated by single families.

The form of landholdings reflects an original haphazard division of a featureless plain and more or less systematic subdivision thereafter, so that, although there was no unity of orientation at the start, the later straight-line boundaries generally form rectangular subdivisions.

in the corral, fed on alfalfa or allowed to browse after harvest in the cornfield. No less important than the machinery and the horses is the farmer's family of seven children. With the farm all under one crop, it is the family that supplies the concentrated demand for labor at harvesttime.

The land is fertile silt loam with light subsoil and has produced corn

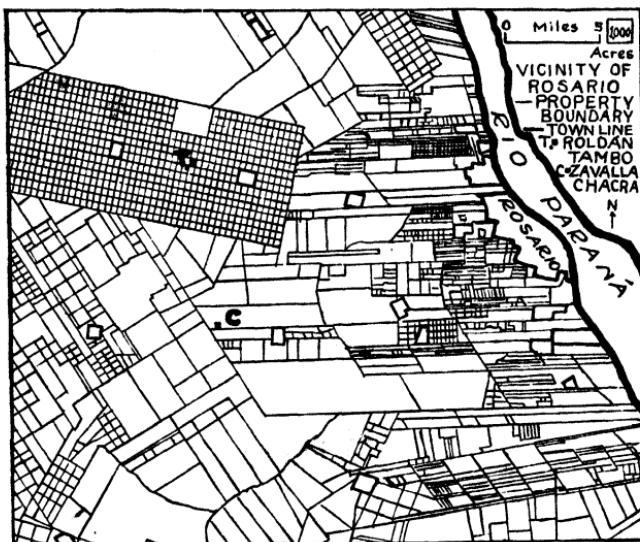


FIG. 378.—An area of about nine hundred square miles in the vicinity of Rosario. Intricate division and subdivision of property. Zavalla and Roldán farm sites.

**CORN FARM.** One of the small subdivisions is the Chacra Zavalla, rented by an Italian immigrant from a larger property. It consists of a single cornfield 148 acres in extent, interrupted only by a 2-acre strip of alfalfa, a vegetable garden, and a corral grouped around the farmhouse (Fig. 379).

The dwelling is a two-room brick hut located apparently at random in the midst of the flat cornfield. No other buildings are required. The farm machinery, ample modern equipment for producing the one crop, lies unsheltered behind the house. The eight farm horses are kept all year

continuously for years. When the annual rainfall reaches the usual amount of nearly forty inches the yield is commonly forty bushels per acre, but occasionally a summer drought reduces the crop. The ears are gathered in bags and taken by wagon to a crib of cornstalks (Fig. 380) near the house to await the arrival of a sheller in its round of the community. Then the shelled, bagged product, flint corn of export quality, is hauled to the near-by railway station for sale and shipment to the port.

This simple specialization in the best marketable crop that the soil will

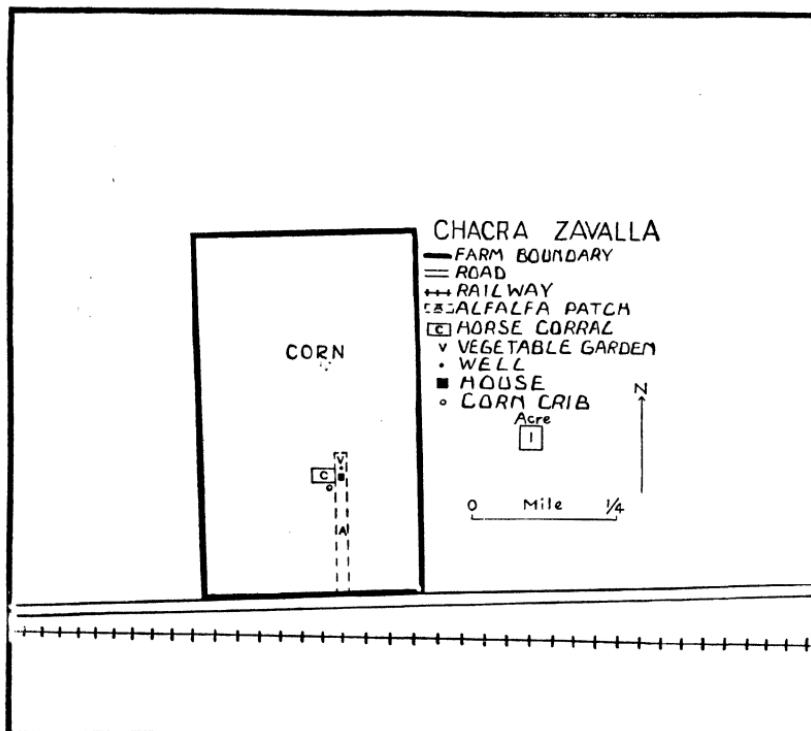


FIG. 379.—A one-field tenant farm in a larger property, vicinity of Rosario (Fig. 378).



FIG. 380.—Farmstead of the Chacra Zavalla. The cornerib and loading device on the left, the house in the background.

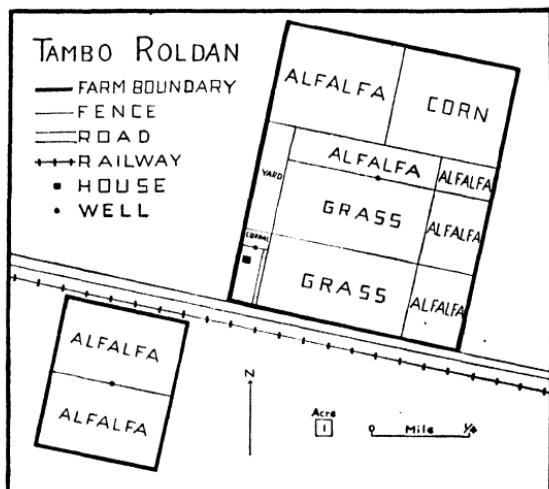


FIG. 381.—Dairy farm in a rural subdivision of Ferrocarril Central property, vicinity of Rosario (Fig. 378).

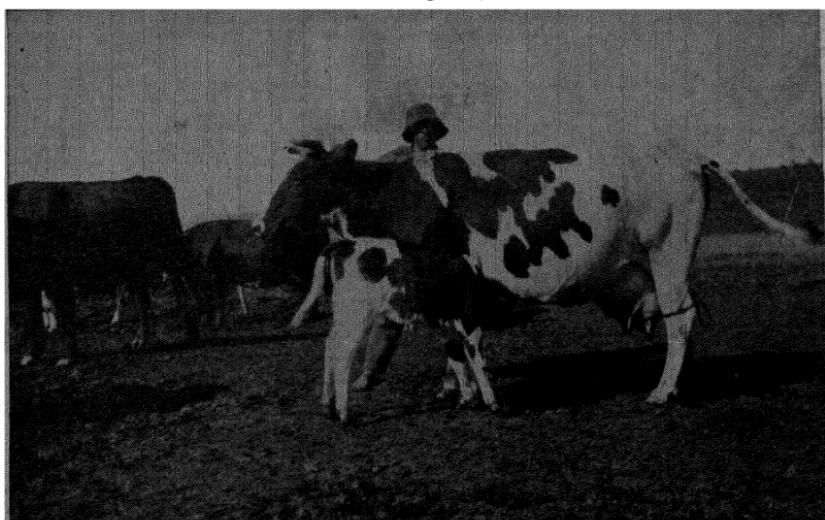


FIG. 382.—Cows and calves in the milking corral, Tambo Roldán. View looking southeast, grass pasture in the background.

produce is a natural mode of procedure for a poor family occupying the land temporarily. But the system involves risk in the uncertainties of the one-crop yield, irregularities in labor needs, and inevitable depletion of the soil. Because there are other possible crops and other farmers who are better off, this is not the only type of farming.

**DAIRY.** A less simple item in the pattern of terrene occupance is represented by the Tambo Roldán (Fig. 378). It is rented by a Basque immigrant who has some capital. The land is similar to that of the Chacra Zavalla, but contains a slightly depressed area that is poorly drained.

In the 351 acres comprising the farm, corn occupies one field of 47 acres, marketed like that of the *chacra* but grown in rotation (Fig. 381); alfalfa occupies 188 acres in six fertile fields, growing luxuriantly and available for pasture throughout the year or for five cuttings of hay in summer, and maintaining itself for 5 years before replanting; natural grass pasture occupies most of the remaining 116 acres in the two poorly drained fields.

This combination is the basis for a dairy establishment of 80 cows (Fig. 382). Calves are kept with their mothers, and the products of the establishment are fattened calves and a moderate amount of milk, which is taken to a near-by factory for the production of cheese and casein for export.

The only building needed on the dairy farm is a small house for the farmer and his family. It seems natural that this establishment with its easily productive and accessible land should be a prosperous contributor to a world market.

The Tambo Roldán and the Chacra Zavalla represent characteristic land utilization in the vicinity of Rosario. Obviously, the one-crop farm is not a permanent establishment, but it is a short step from this to some sort of stable combination of grain, pasture, and livestock such as that of the tambo. Already the *chacra* has a few pigs. Thus the pattern of occupance seems to be approaching the stability of mature development.

## 9. ISLA SCARSI<sup>1</sup>

### AN ORCHARD IN THE PARANÁ DELTA

At Buenos Aires the lowland plain of central Argentina is bordered by a broad estuary, the Rio de la Plata. A few miles northwest of the city the central plain ends just as definitely in a low barranca, but beyond its edge is a maze of islands and narrow channels, the delta of the Paraná, at the head of the estuary [Figs. 328(9) and 383].

Here the pattern of occupance is distinctive and unlike that of the adjacent plain. Instead of rectangular properties hundreds or thousands of acres in extent, here are irregular island properties, in many cases minute sectors of small islands.

Such a sector of an island is the Isla Scarsi (Fig. 384), a property of 10 acres fronting on one of the river channels (Fig. 385) and extending back to swamplier land in the center of the island. As its name implies, the Isla Scarsi is itself practically an island, bounded like its neighbors by drainage ditches. Only in recent years and only in a specialized way has this land been cleared and put to use, unsuited as it is to easy or extensive farming operations.

Under the conditions, horticulture has been found suitable. Intensive crops responsive to special treatment are favored here where the land is

<sup>1</sup> Field work in April, 1930. *Ibid.*, pp. 417-419.

fertile, limited in extent, and difficult to work and requires a system of drainage ditches. Moreover, frost hazards are lower on the delta islands close to warm river water from lower latitudes than on the open plains, and Buenos Aires, on the edge of the plains and close to the delta, provides a market for fruit. Therefore, fruit is

river. The middle-latitude fruits are more important here.

Since the first planting at the Isla Scarsi, land progressively farther and farther from the river has been cleared, drained, and planted. The interior is not lower than the river except at times of very high water, and usually the main ditches drain from the swamp

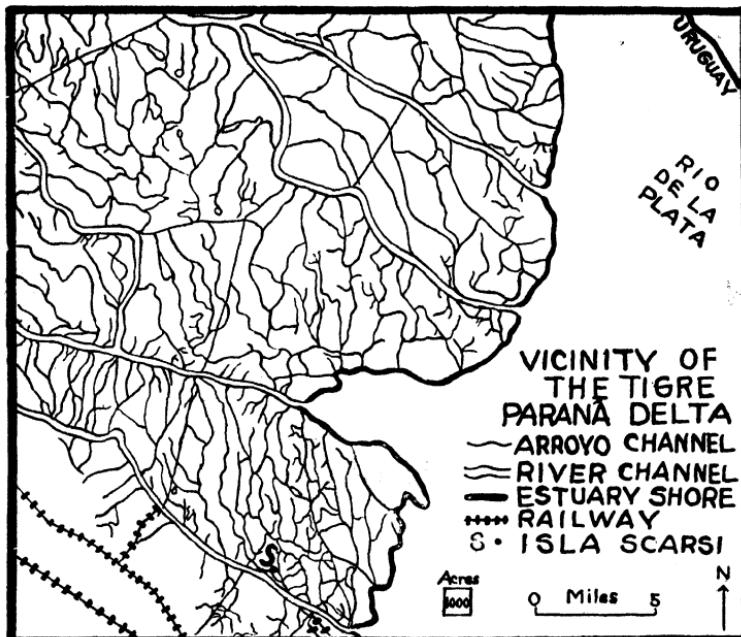


FIG. 383.—An area of about nine hundred square miles in the Paraná Delta. Major and minor river channels, "arroyos" (always carrying water, unlike dry arroyos in arid uplands). Site of Isla Scarsi.

grown by the Italian settler at Isla Scarsi as well as by most of his neighbors. With the development of the district, marketing has been facilitated by the establishment of a cannery on a near-by delta island.

A natural levee near the river forms the highest part of the Scarsi land. This is the oldest part of the orchard, started with a planting of oranges. Only hardy oranges can be grown, and most of the Argentine supply comes from subtropical areas farther up the

into the stream. But secondary orchard ditches drain into the swamp (Fig. 386).

Fruit planting has left only a small grove of willow trees at the swampy end of the property and a patch of poplars near the house. Willows and poplars, either planted or growing wild on the unimproved delta land, provide a fairly profitable harvest as fuel for the near-by metropolis on the coalless and treeless plain. But the yield from firewood is too low for good land,

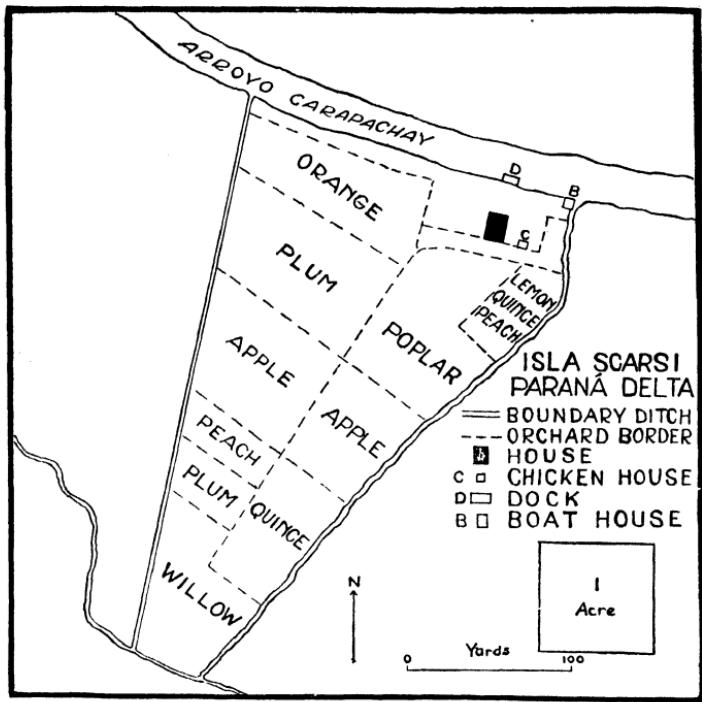


FIG. 384.—Fruit farm in the Paraná Delta, an “island” bordered by a minor river channel and drainage ditches.



FIG. 385.—Minor channel in the Paraná Delta (Arroyo Carapachay). A boatload of delta produce. View looking east from the landing place of Isla Scarsi.

and the larger amounts come from less developed outlying parts of the delta.

A final phase of delta development is as a place of recreation for the city, having the attraction of waterways and woods unique in the vicinity. Accordingly, the Isla Scarsi is an open-air restaurant and picnic ground, and the income from this source is almost as great as from fruit. All transportation, whether of fruit, firewood, or pleasure

seekers, is by the network of waterways (Fig. 385) connected with the outside world by a railway terminus on the delta margin.

In none of these respects are great changes in prospect for the delta district. In spite of close relations with the near-by urban complex, relative simplicity and stability of development seem to have been readily attained in this area of special and limited possibilities.

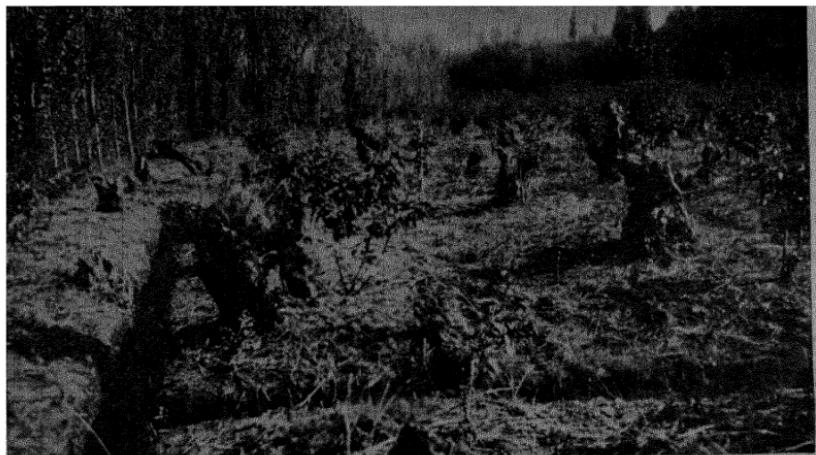


FIG. 386.—New plantings of apple and quince trees, Isla Scarsi. Old woodland stumps and new drainage ditches. View looking southwest from the back slope of the natural levee toward willow trees at the lower, inland end of the property.

## 10. CHOELE CHOEL<sup>1</sup>

### A SHEEP RANCH IN THE DRY PAMPAS, NORTHERN PATAGONIA

Upon turning from the shoreward to the landward side of the central farming region, much greater areas of special and limited possibilities are in evidence. Bordering the core region is an expanse of semiarid bushy plain. In this area far out beyond the margin of agricultural land is the next district to be considered [Fig. 328(10)].

The fact that this district is included in Patagonia and not in the dry pampas adjoining the farming region does not

mean that it is different in itself from the rest of the semiarid belt. In fact, northern Patagonia would probably be considered as an integral part of the semiarid belt if it were not for the fact that it lies west of a semiarid coast instead of a wet fertile coast and therefore has had a political history and regional relations different from the area immediately north of it. Practically, it is now a coherent part of the dry western pampas.

<sup>1</sup> Field work in March, 1930. *Ibid.*, pp. 419-422.

Choele Choel on the Rio Negro is unlike a great majority of places on the dry pampas in having a concentrated source of water. The island of Choele Choel is a newly formed oasis in the semidesert region, a flood-plain area partly protected by dikes and recently irrigated by canals from the river. The relative intensity of its agricultural development is indicated by the subdivision of property; most of it is in farms of about 250 acres with

property includes 1 square mile of swampy pitted flood plain, 8 square miles of low terrace, a strip of valley bluff 80 feet high, and above this 40 square miles of almost flat plain (Fig. 387). Terrace, bluff, and upland all are occupied by dry bush vegetation. A large proportion of the bushes are useless, but some have leaves and some berries edible for animals, and there is a little bunch grass, green after rain.

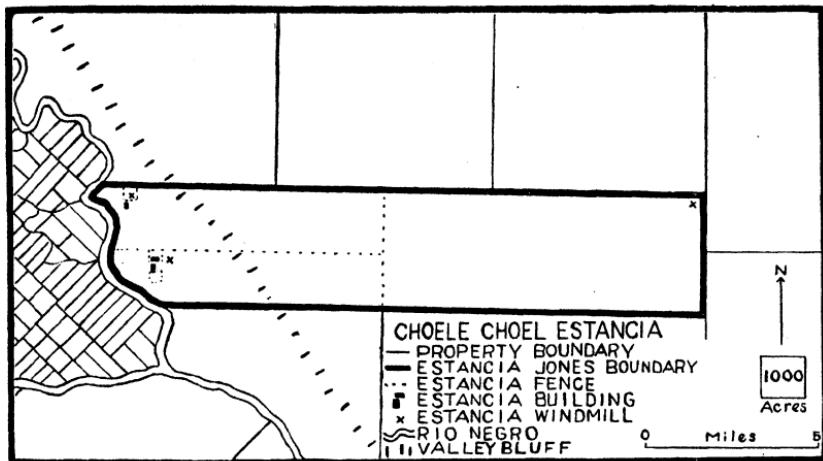


FIG. 387.—Sheep ranch in the vicinity of Choele Choel. The southeastern end of the island of Choele Choel on the left side of the map. The upland plain is about five hundred feet above sea level.

alfalfa as the chief crop, and some of it is in farms as small as 12 acres devoted to apples, grapes, and other fruits, like orchards of the Paraná Delta in size and products (Fig. 387).

Except for this recent island development, almost all the land in the vicinity is unirrigated. The pattern of property division suggests the contrast in land occupancy. Single properties are larger than the total area of irrigated land on the island. One of these landholdings offers an example of occupancy in the district.

The Estancia Jones has an area of 32,000 acres with a river frontage of 4 miles. Inland from the river the

The *estancia* has 2,000 sheep, 1 to 16 acres (Fig. 388). Occasionally in unusually moist years, there have been three or four times as many, but recently there have been dry years. The average annual rainfall is 10 inches, with large variations from the average. The sheep graze in the upland when there is available pasture there, ordinarily in the cool winter season. In dry periods, generally in summer and sometimes all year, they are confined to the valley, where there is slightly more vegetation.

Improvements include a fence around the property and two inside dividing fences, a well 100 feet deep with wind-

mill and tank in the upland and two shallower wells in the valley, two houses at the lower edge of the terrace

Wool is the chief product. The sheep are sheared twice a year; the unwashed clip is bagged and taken by truck to



FIG. 388.—Sheep in bushy pasture of the valley terrace, Estancia Jones.

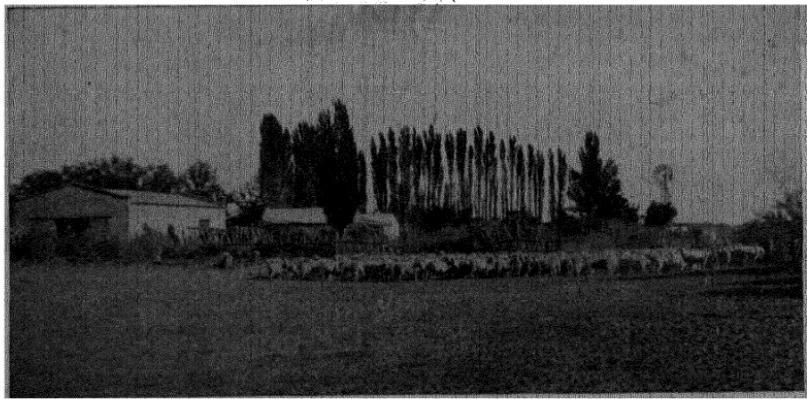


FIG. 389.—Headquarters of Estancia Jones, on the valley terrace, near the Rio Negro. Sheep in corral for shearing; shearing shed at left; house of one of the owners in the background.

for the Argentine brothers owning the establishment, and at one of the houses a corral and a shed for shearing and wool storage (Fig. 389).

the railway at Choel Choel station 15 miles away. Sheep are sold at irregular times, some fat ones when pasture is unusually good and some

thin ones when the pasture is too poor to sustain them. Sheep for shipment are driven to the next station, 12 miles beyond Choel Choel, loading pens being provided only at every other station, presumably on account of the sheep's ability to walk long distances.

The *estancia* is not very prosperous and in a series of dry years seems almost worthless. Here multiformity and changeability of land occupancy are unheard of under the limitations of scanty opportunity. The size of the Estancia Jones is similar to that of

Chapadmalal, each representing an old division for extensive grazing purposes; but, unlike farms in the central region, the dry properties of the Choel Choel District all have remained large and show no signs of changing to new forms of occupancy.

Even the advantage of having unirrigable land in the valley seems too slight to be important. Northeastward across the plain from the Rio Negro to the edge of the central farming region, there is very little variety in the pattern of occupancy.

## 11. PUZILLON<sup>1</sup>

### A VINEYARD IN THE ANDEAN PIEDMONT, MENDOZA

Far west of the core region where the dry pampas end at the foot of the

particularly the Rio Mendoza, here breaking from the mountains, provide

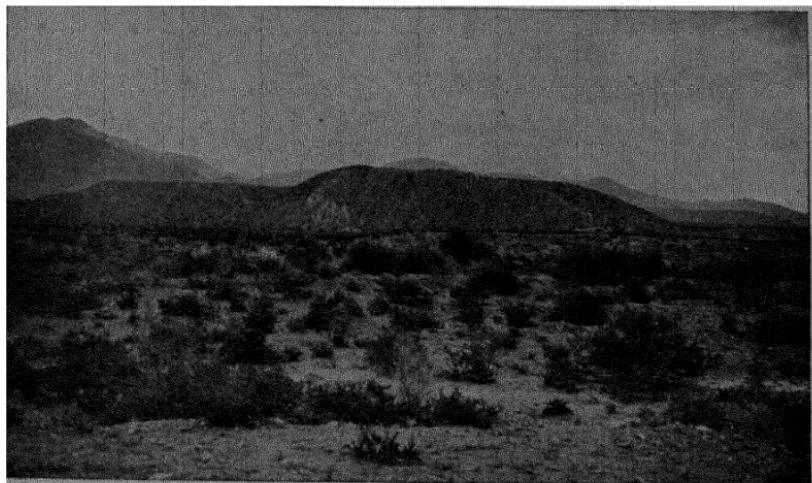


FIG. 390. Dry plain at the foot of the Andes, close to the Mendoza oasis. View looking northwest into the mountains.

Andes [Figs. 328(11) and 390] are piedmont oases. At Mendoza the plain is even drier than at Choel Choel and is not organized in a pattern of fenced and functioning *estancias*. But streams from the high Andes,

water for an oasis much larger than the island of Choel Choel (Fig. 391).

The pattern of land division suggests the sharply restricted form of the area reached by water from the river and the intricate dissection of this area into

<sup>1</sup> Field work in March, 1930. *Ibid.*, pp. 422, 423.

small functional units, which are irregular because of a long history of unsystematic development.

One of the very small units is the Viña Puyzillon in the midst of the oasis (Fig. 392). Water from the chief diversion dam of the Río Mendoza

grant who came as a laborer to the newly planted vineyard 36 years ago.

The property has an area of 11 acres sloping gently northeast, all of fertile silt soil, occupied by French wine grapes of one variety. The rows extend approximately north and south, as is

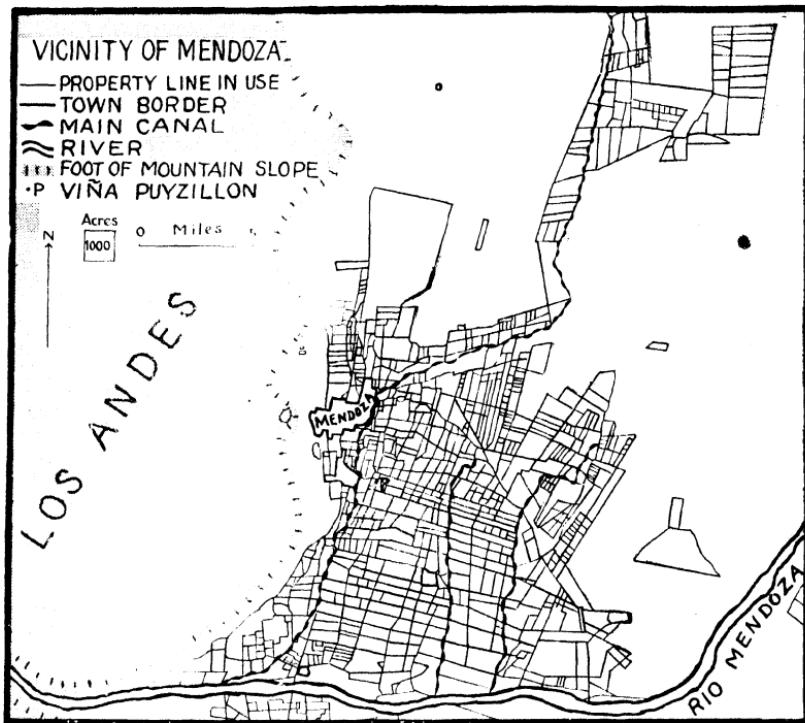


FIG. 391.—An area of about nine hundred square miles in the vicinity of Mendoza. Pattern of property divisions actively used, mainly under irrigation. Site of Viña Puyzillon. Outside of irrigated land, property divisions exist but are not visibly distinguished.

reaches it by way of a main canal and secondary canals by which finally its proportionate share is delivered to the little vineyard (Fig. 393). The vines are irrigated every two weeks during the latter part of the growing period and are fondly cared for by the owner during the rest of the year, with very little hired assistance for pruning, tying, cultivating, and fertilizing. The owner is a French immi-

customary in the district, probably in deference to prevailing winds.

Near the house is a patch of corn. Some vegetables for family supply are grown between the vines, and a few fruit trees grow along the north side of the vineyard road and the south boundary of the property, where they do not shade any of the vines.

The only building is the dwelling house, a well-built villa in a corner

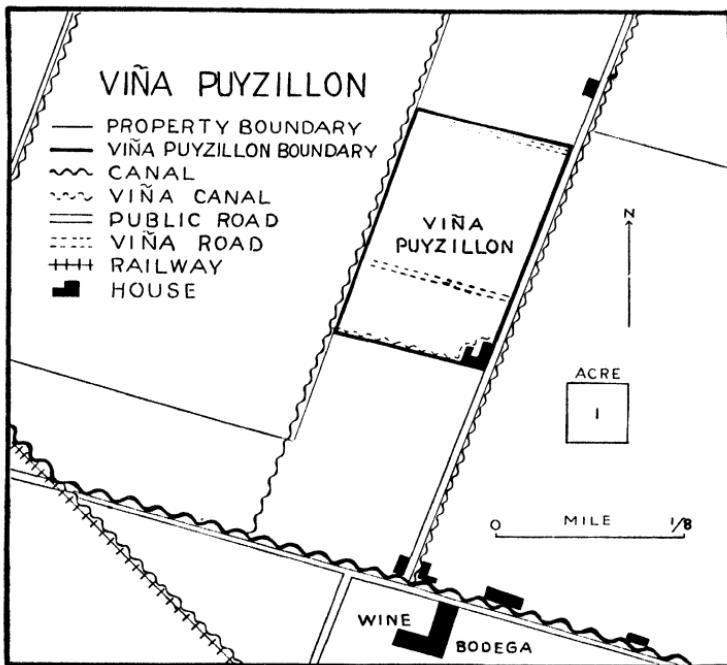


FIG. 392.—A small vineyard in the Mendoza District.



FIG. 393.—Water flowing into the vineyard, the owner standing at the right, *Viña Puyzillon*. View looking northeast from the road across the property.

of the vineyard close to the public road. The establishment is too small to have its own wine press, and the grapes are sold when gathered, being hauled directly to a commercial wine bodega. The harvest is a concentrated effort requiring extra hired labor—15 people for 10 days.

In the Mendoza District many vineyards are larger than the Viña

Puyzillon, and some produce other kinds of grapes, table grapes as well as wine. Vineyards are not the only kind of farm enterprise, but wine is the leading interest and the Viña Puyzillon a typical small establishment, an example of simple and stable development in a district of special and limited possibilities.

## Chapter IX. Uruguay and Paraguay

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Uruguay and Paraguay are the two small countries between the two large countries of southeastern Latin America. The epithet "buffer states" is suggested by their size and position and has some justification in view of conditions along the line of contact between Spanish and Portuguese America (Figs. 2, page 10, and 154, page 172). They may be compared with the Guiana colonies at the other end of the same line of contact, though they occupy parts more favorable for settlement.

Aside from the resemblance to each other in size and position, Uruguay and Paraguay have little in common. A chance similarity in names has encouraged comparison between the two countries, generally in favor of Uruguay. Such comparison of one country with the other may be less fitting than informal comparison of each country with near-by parts of Argentina. Uruguay is adjacent and similar to the core region of Argentina; Paraguay is adjacent and similar to the far north and northeast of Argentina (Fig. 328, page 331). That Paraguay differs disadvantageously from Uruguay is apparently not to the discredit of the Paraguayans or their government.

**URUGUAY.** As a matter of fact, not only Paraguay but all other South American countries suffer by a formal comparison with Uruguay. In general, Uruguay has a greater commerce per capita, a greater proportion of its land used productively, a more complete system of modern land transportation, and a higher proportion of white population than the other countries. Such apparent superiority requires analysis; as might be supposed, it does not indicate unique regional development so much as distinctive national structure (as in the case of El Salvador in comparison with other Central American countries). Uruguay, the smallest South American country in areal extent, leads in several national generalizations because it has no unproductive outlying regions to be averaged with the core region.

Comparisons between Uruguay and its neighbor of similar size, the leading Argentine province of Buenos Aires, are slightly in favor of the latter. Uruguay has a smaller proportion of its land in crops, a smaller

production of high-grade chilled beef, more low-grade animal products, less commerce, and a less complete system of modern transportation. These differences are apparently not to the discredit of the Uruguayans or their government but are quite consistent with soils somewhat less fertile for grains and alfalfa, climate of slightly lower latitudes within the zone of cattle ticks, and easier national continuance of conservative land policy.

In land surface and soil, much of Uruguay is like the southeastern part of the province of Buenos Aires, near Mar del Plata, an undulating upland of moderate fertility; in climate, it is like parts of Argentina north of Buenos Aires; in national organization, it is less involved than any part of complex Argentina.

That Uruguay is a simple uniform country, unenlarged by less populous outlying regions, is a fact depending on its situation as a minor nucleus of settlement hemmed in by bordering regions of two great neighbors, yet left unsubmerged by common consent between them.

Almost all Uruguay is an undulating lowland plain, with grass cover and a climate of the humid subtropical type (comparable with that of the Humid Pampas and so in some respects with that of Texas) (Figs. 4, page 12 and 5, page 13). The area is commonly classed with the Paraná lowlands, although structurally it is the low-lying southern margin of the Brazilian highlands (Figs. 3, page 11, and 7, page 15).

PARAGUAY occupies another marginal part of the Brazilian highlands, similarly low-lying and classed as a lowland area in altitude and climate, more nearly tropical than Uruguay and including forest as well as grassland (Figs. 3, page 11, 4, page 12, 5, page 13, and 7, page 15). In addition, Paraguay has in its western areas an adjacent share of the Paraná lowland plains, particularly a portion of the Gran Chaco. In fact, Paraguay is more complex territorially than Uruguay, with a populous nucleus and distinctive outlying areas (Figs. 8, page 16, and 328, page 331).

The core of Paraguay is an undulating plain, transitional between forested hills of the east and marshy plains of the west, habitable and productive, occupied successively as an Indian center, a Spanish center, and a distinct upriver national center.

As an inviting district of varied resources for subsistence living the core area is no less habitable and productive now than formerly and is well-populated by people of Indian and Spanish blood. But areas surrounding the Paraguayan nucleus are inferior and refractory for settlement: on the east, less accessible forested uplands; on the north, tropical savannas; to the immediate south, marshy plains; and to the west the Gran Chaco, partly described as flat, forested, and poorly drained, but less known for any one positive natural characteristic than

for the pervasive negative quality of unfitness for settlement as compared with neighboring lands, and therefore recognized on all sides as *chaco*, wild Indian hunting ground.

Among such outlying areas the attractive but limited core of Paraguay has become relatively less important since the later rise of near-by countries favored by specialized commerce. Large parts of the surrounding regions have fallen to the strong neighbors, and Paraguay survives as a small country by common consent among large ones, after lately holding a final share of the Chaco against the only resistible neigh-

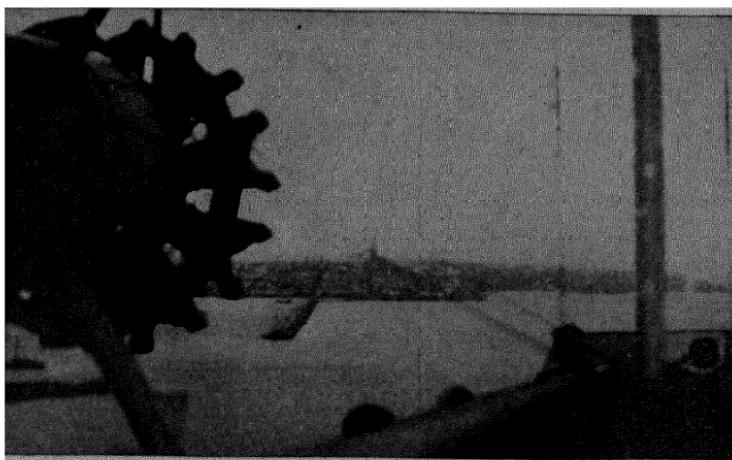


FIG. 394.—Montevideo, capital of Uruguay. Air view eastward, looking forward from the hatch of a seaplane of the "Nyrba" airline (antedating Pan American Airways), April, 1930.

bor. In Paraguay, according to prescription, a small populous area far from large centers forms the core of a small country.

**RELATIONS NEAR AND FAR.** The association of Uruguay and Paraguay, respectively, with central and far northern Argentina is more than a mere comparison. Uruguay and the province of Buenos Aires share the estuary mouth of the Paraná, the Rio de la Plata; their twin railway nets focus on neighboring ports (Figs. 330, page 333, and 394); their populations have common ties and interests, as well as similarity of color.

Paraguay has a larger center of population than northern Argentina; but not only does the country resemble northern Argentina in its few lengthy straggling transportation lines, but it is the northern objective and terminus of Argentine lines, both rail and river (Figs. 330, page 333, and 395). The Paraguayan population is gathered in a more concentrated center than any in northern Argentina, but it is related to neighboring

Argentine communities; sedentary Indians in Corrientes, forest workers in the Gran Chaco, and German colonists in Misiones.

In measured miles, Uruguay and Paraguay are far away from the United States, at the negative pole of international contacts between North and South America. But in their characteristics and interests as revealed through field observations they are no farther away than other countries. They offer unusual opportunities for mutual understanding and cooperation with little or no prejudice from the past. Though

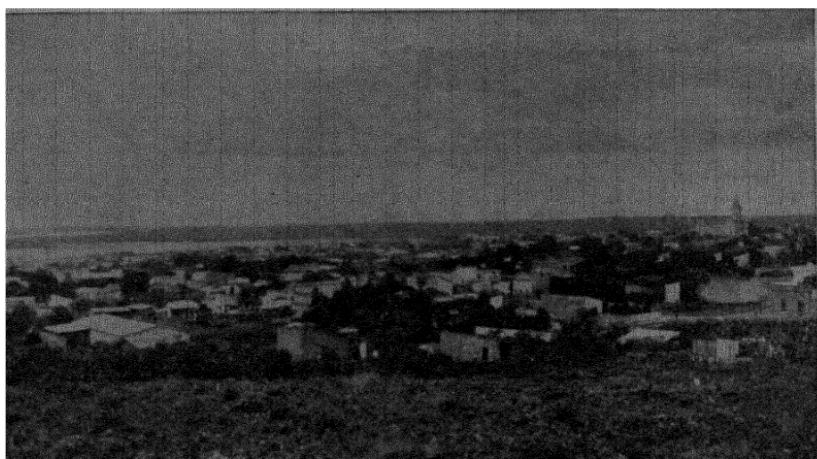


FIG. 395.—Asunción, capital of Paraguay. Rio Paraguay in the left background; the Chaco beyond. View looking north from a hill outside the city, April, 1930.

small, they are not insignificant faraway spots to be overlooked in new inter-American relations.

### Field Studies

Uruguay is not a uniform area—no more so than the core of Argentina. But Uruguayan variety from place to place is of a minor sort, in certain details, as compared with the general uniformity of the area. An air traverse in the western part of Uruguay serves to indicate conspicuous characteristics of the country (12).

The core of Paraguay is a well-populated and productive farming area. Characteristic occupancy is indicated in the study of a small farm (13). Outlying areas of Paraguay are not represented by specific studies but seem hardly to require inclusion in this reconnaissance, except as taken into account in generalizations. Observations in Uruguay and Paraguay supplement those in neighboring countries.

## 12. URUGUAYAN TRAVERSE<sup>1</sup>

In northwestern Uruguay, little or no regional variety appears in an air traverse of a hundred miles [Fig. 328(12), page 331]. Elements of the landscape are plainly recognizable; details recur in simple combinations.

The land surface is an undulating upland plain. Dissection is in a dendritic pattern of low relief. In some of the broad shallow valleys, small

The scene is dominantly pastoral. *Estancias* occupy most of the land, each apparently of thirty or forty square miles in area. In many if not most cases a single *estancia* is a rectangular tract of land, quartered by barbed-wire fences into four pastures and having headquarters established at a central point where the four pastures meet (Fig. 396).

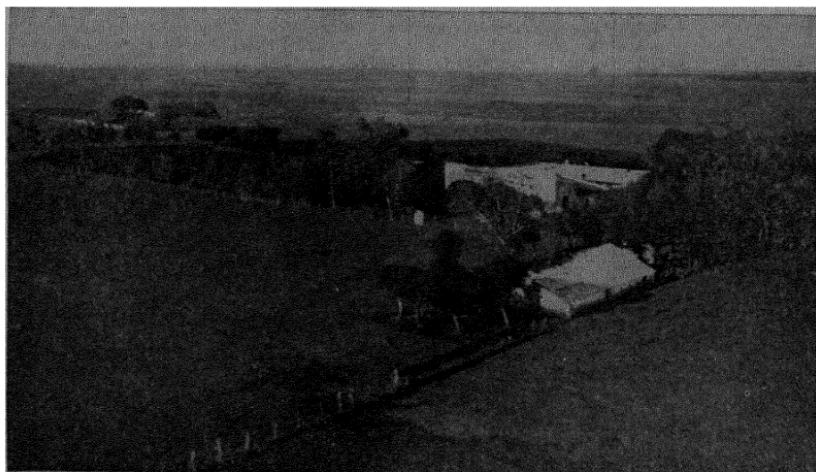


FIG. 396.—Headquarters of an *estancia*, northwestern Uruguay. House, garden, shade trees, and small planted fields. Outside the central establishment, large pastures of natural grassland, separated by wire fences. Air view looking northeast.

streams flow over a rocky bed. On some low rounded ridges, patches of weathered bedrock are exposed. But most of the surface is mantled by dark residual soil under a cover of green grass. The open undulating grassy expanse extends with only minor interruptions to an even sky line.

The minor interruptions include the following: individual trees of one sort, the native *ombú*, generally miles apart; small groves of planted trees and gardens around groups of buildings, also miles apart; and straight fences, miles long.

The only signs of pasture-land improvement are the fences, these being so inconspicuous and far apart as not to be visible one from another. For pastureage the grassland is good by nature. Water is supplied by streams. Views over the landscape commonly include herds of Hereford beef cattle and flocks of crossbred wool and mutton sheep; irregularly distributed, cattle and sheep are separated from each other in some cases and together in the same pastures in others (Fig. 397).

There are no buildings to shelter the animals or to store fodder for any

<sup>1</sup> Field work in April, 1930.

season of the year. Central headquarters commonly include only a one-storied residence of Spanish patio type, a few small dwellings for laborers, and a cultivated plot of an acre or more (Fig. 396). The rectangle of cultivation contains eucalyptus trees for shade and food crops for domestic supply, among which oranges, vegetables, and corn are conspicuous.

Larger areas of cultivation are exceptional, but there are a few excep-

Another special element of the landscape is the Uruguay River a few miles to the west and nearly parallel to the traverse. The valley is shallow and inconspicuous and seems to be almost filled by the river. A few towns appear on its banks, particularly at two points along the traverse where Uruguayan railways reach the river.

Northwestern Uruguay does not provide a complete picture of the country. But there is an approach



FIG. 397.—Cattle and sheep in natural grass pasture, northwestern Uruguay. Air view looking southeast. Animals disturbed by low-flying plane.

tions—two cases in a hundred miles, where apparently an *estancia* has been made into an agricultural colony. In these places, cultivated crops cover the land in rectangular fields, of small size compared with *estancia* pastures though large for individual family cultivation, averaging a hundred acres or more.<sup>1</sup> Corn and small grains are the crops grown. Houses are small and light in construction. The aspect is that of *chacras* in near-by parts of Argentina.

to uniformity throughout Uruguay;<sup>1</sup> thus, types of features seen along the traverse appear with minor variations in most other parts of the country, and no subdivision of the country into contrasted regions is commonly established.

Some regional variety is recognized, in districts of more grain growing and of dairying in the southwest and of intensive horticulture near the city of Montevideo.<sup>1</sup> But these are not sharply distinguished. Even close to Montevideo there are undulating grasslands

<sup>1</sup> ROBERT C. KLOE, "Pastoral and Agricultural Occupance in Uruguay," University of Chicago M.S. Thesis, 1937.

where sheep and cattle graze, observed in the course of a short supplementary traverse.

The same regional characteristics extend beyond Uruguay, at least for short distances to the west in the Argentine province of Entre Ríos and to the north in the Brazilian state of Rio Grande do Sul, where seen near

the Uruguayan traverse and its northern extension.

Greater regional differences appear farther to the north—in Argentine Corrientes, where there are flat poorly drained grassland, in Argentine Misiones where there are wooded uplands and orderly plantations of yerba mate, and in Paraguay where there are small mixed woodland farms.

### 13. ISATÚ<sup>1</sup>

#### A PARAGUAYAN FARM

This is a report of field study focusing attention on one farm selected as a typical unit in the pattern of rural occupancy in the heart of Para-

cluster of rural population forms the recognized heart of the Paraguayan nation, with Asunción, the capital, as its chief urban focus.



FIG. 398.—Fields of Vera Farm. Cotton at left, cassava (manioc) at right. View looking northwest across the property.

guay [Fig. 328(13), page 331]. The site of the study is in the southwestern part of the country near the Paraguay River, which here separates Paraguay from Argentine territory in the Gran Chaco. Thus it is not in the geometrical center of the country, but rather in the geographical core where the principal

The Isatú District is 15 miles southeast of Asunción. The land is an undulating plain of reddish sandy soil, fairly well drained and fertile, not visibly interrupted either by steep heights or low flats, although there are wooded mountains not many miles to the northeast and grassy marshes not

<sup>1</sup> Field work in April, 1930.

many miles to the south. The view is bounded by overgrown lines of trees and bushes separating small fields (Fig. 398). Palm trees are conspicuous, both scattered and in clumps. The landscape is that of the semitropics, with a growing season of more than nine months of heat and moisture and only a few light frosts in a mild winter.

**COTTON FARM.** Vera Farm is one of many small establishments in the district. Its share of the plain is a strip

The house is of wood and stucco with a galvanized iron roof, Spanish rather than Indian in style but simply designed and barely furnished (Fig. 400). Household activities are largely in the open air in the shade of an arbor covered by grape vines. Additional shade as well as a valuable part of the family food supply is provided by a disorderly but prolific clump of fruit trees on the other side of the house, including oranges, peaches,

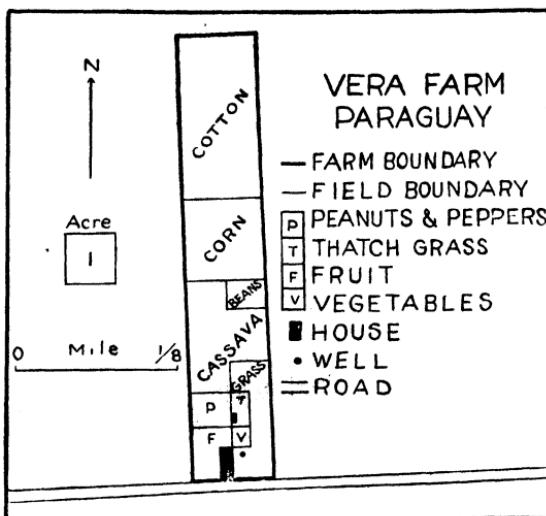


FIG. 399.—Land use in a Paraguayan farm.

of land 100 meters wide and 550 meters long (Fig. 399). Its form suggests a "long-lot" property division based on road frontage. The road is poor and unimproved, sometimes impassable at mudholes; but it does provide a significant connection with the outside world, and the house is located close to it.

This is the place of residence and source of livelihood for a family of nine—Dionesio Vera and his wife and seven children, Paraguayans of mixed white and Indian blood, speaking Spanish but understanding also the Guarani language.

mangoes, papayas, avocados, and bananas.

All the rest of the 14-acre strip of land is divided into small fields and smaller garden patches, bounded by trees and bushes and by a shallow ditch to drain the nearly level ground. Almost half the area is occupied by subsistence crops, corn and cassava each in a 2-acre field, and garden crops in small patches: beans, peanuts, peppers, eggplants, and other vegetables, and a supply of thatch grass. The scattered palm trees yield a subtropical dwarf coconut, sometimes used for food and sometimes for oil.

There are also 2 acres of grass and enough incidental fodder in harvested

attractive market for a small miscellaneous surplus. Cassava is the only one



FIG. 400.—House of Vera Farm. Family sorting harvested cotton in the shade of the grape arbor. Well at right; fruit trees behind the house.



FIG. 401.—Bags of cotton in oxcarts en route to a gin at Asunción, Isatú District.

fields to support seven cows, three donkeys, and an assortment of poultry. Altogether these furnish sufficient food for the family. Possibly there would be something to spare if there were any

of these which occasionally finds its way to the city.

The one good market crop is cotton. This occupies the largest field, 5 acres, and assumes a leading place in the

farm (Fig. 399). It is planted in September, grows for 7 months through the summer, and is harvested in April, early autumn. The annual production of about two tons is cleaned by hand and bagged. The market is in Asunción, and at harvesttime trucks and wagons make their way through the countryside and carry the crop to gins in the city (Fig. 401).

Other crops are planted earlier in the season and harvested in midsummer. Corn and cassava may be started as early as June, in the dead of winter.

There is no regular crop rotation, but changes are made when production is poor. Cotton, which receives primary consideration, sometimes occupies the same field for two or three years and then is followed by cassava or corn. All the land is arable and similarly suitable for any of the crops.

**CORE REGION.** Vera Farm seems to be typical not only of Isatú but of the whole agricultural heart of Paraguay. Small establishments with small fields of similar subsistence and market crops are in evidence, and fields as large as 25 acres of cotton, corn, or cassava are nowhere to be seen. Sugar cane should be mentioned as another small-scale crop on some farms, and sugar mills of the one-ox-powered type are fairly common. A German colony also in Isatú is slightly different in the greater neatness and regularity of its fields, but the same crops are being grown on the same small scale. The more intensive Ger-

man cultivation and the effort to substitute commercial products for some of the old fruit and vegetable subsistence crops may or may not prove successful.

A different productive interest is represented by a meat-packing plant 5 miles distant near the river, but this establishment receives its cattle almost entirely by barges from grazing lands upstream, chiefly on the Chaco side. There is also a lumber mill on the river that likewise receives its raw material by water from north and west, indicating more clearly that this is the heart of Paraguay and that it is dominantly a farming region.

These other interests draw on resources of the periphery and do not obscure the fact that small farming is the leading interest in the heart of the country. In the past, the farms were purely subsistence farms. In recent years, with government encouragement, they have become partly commercialized, with cotton as their chief commercial product. In the future, they may become more commercialized as trade in perishable food crops is increasingly organized to take advantage of subtropical production for the near-by middle-latitude Argentine market. Export of oranges is already a significant item. In any case, as far as productive resources are concerned the prospect for Paraguay seems fairly bright either in a world of international trade or in a world of international barriers and local subsistence.

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## Chapter X. Brazil

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Brazil is the whole of Portuguese America. It has almost one-half the land and the people of continental South America and more than one-third the land and the people of all Latin America.

**FORM OF BRAZIL.** A map may seem to imply that Brazil occupies the heart of the land mass and crowds little neighbors off to opposite edges (Fig. 2, page 10). But this impression contains only a grain of truth and that to be viewed in a special light. The map is not evidence of aggression by a strong central power against weak marginal nations. Brazil is no more "central" or less "marginal" than other countries; and Brazilian strength is not massed against frontiers. Most of the countries, including Brazil, are marginal in the sense of facing the sea, turning their backs on the interior, and having their populations distributed nearer to the coast than to the geometrical center of the continent (Fig. 8, page 16). On the other hand, Brazil and the other countries are not marginal in a fuller sense: their populations are distributed with little regard for distance from the sea, but on habitable and productive land wherever it may be.

The shape of Brazil is comparable with that of Argentina or even of Paraguay on the south or of Venezuela on the north. Like Venezuela, Brazil has a core region in low highlands near the coast, other occupied areas along the coast to right and left of the core region, sparsely populated tropical savannas inland from the coastal highlands, and far-outlying feebly occupied lowland and highland areas drained by large rivers and reached by sea around the coast from core region to river mouth (Fig. 402).

When the new world was divided between Spain and Portugal in the age of discovery, the Pope who drew the Line of Demarcation through uncharted land and sea could not have foreseen by human insight the offspring of that allotment: on one side of Latin America, 18 Spanish countries; on the other side, a single Portuguese country, spread over the bulk of the Brazilian highlands from middle-latitude humid south to low-latitude semiarid north and over unsanctioned portions of the Guiana

highlands, the Amazon lowlands, and the Paraná lowlands (Figs. 2, page 10, 3, page 11, and 4, page 12).

This uneven outcome was not compelled or promised but is consistent with the circumstances of geography and history. The compact Portuguese angle of South America, with its nearly continuous coastal habita-

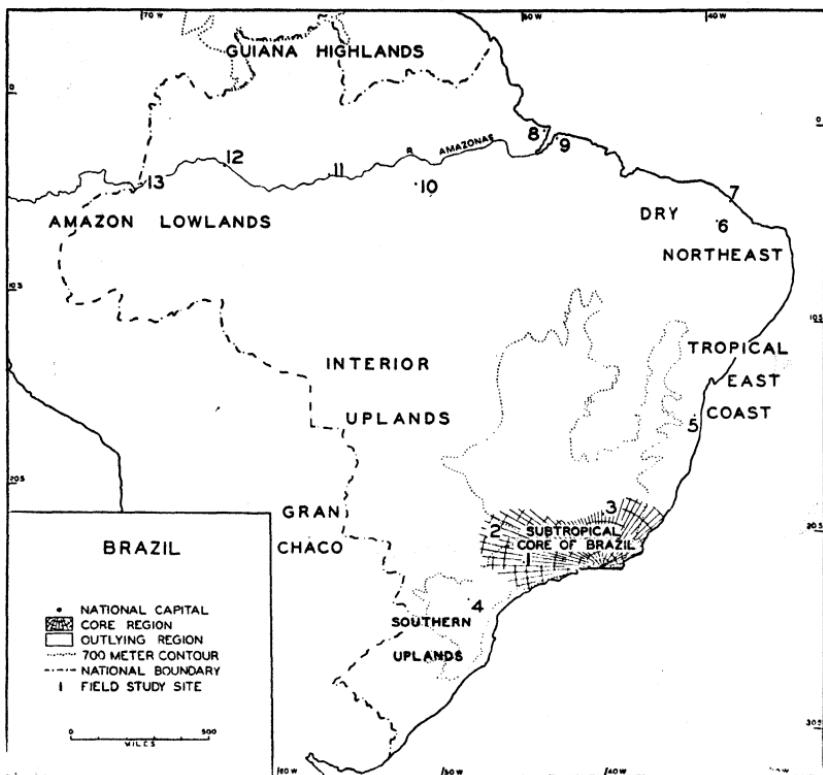


FIG. 402.—Regions of Brazil. Study sites numbered in order of discussion, first in the core and then in outlying regions.

bility and its accessible low highlands and interior lowlands, is more easily subject to unification than the Spanish western highlands of America, with their separate habitable districts and isthmian and island areas from Mexico to Chile. In this setting the successive, connected settlement of Portuguese areas, culminating in the modern preeminence of one region as the core of the country, is in contrast with the contemporaneous rise of separate Spanish centers (Fig. 8, page 16). Moreover, the train of events in Brazil included no disruption with independence, but consolidation imperially confirmed.

The extension of Brazilian territory inland far beyond the original Portuguese boundary line is an amendment consistent with the comparative accessibility of inland South America overland and up the Amazon from the Brazilian coast.

**CORE REGION.** The modern core of Brazil is a complex region extending inland from Rio de Janeiro over a great upland area of varied productivity and dense population (Fig. 402). In some respects, though not by common designation, the region is the greatest plateau of *tierra templada* in Latin America, far surpassing the rare low plateaus and valleys of the western highlands. Here are the same general characteristics of mild temperatures not hot or frosty, moderate rainfall, and smooth fertility, widespread in a distinctive setting of subdued highlands with mature soils at the margin of the tropics. Here is the same wholesome escape from tropical heat without loss of year-round productivity.

The population, largest of any region in Latin America, includes not only a Brazilian mixture of Portuguese and Negro blood, but also recent important increments of European stock, particularly Italian, Portuguese, and Spanish immigrants.

Productive enterprise has turned primarily to coffee, mainstay of the *tierra templada*, enough to lead the world, and secondarily to other tropical and subtropical specialties and to subsistence farming. The resources include minerals at some spots—gold as a basis of rising importance in the past, and iron deposits, probably the greatest in the world, as a basis of possible importance in the future.

**OUTLYING REGIONS.** Along the coast and inland from the core area are the outlying regions of Brazil, most of them larger and more populous than some independent countries of Spanish America, but all of them less important than the great core region of the Brazilian coastal highlands.

The outlying members of first magnitude flank the core region and front on the eastern coast, from the oldest settled areas of the country in the northeast to the newly settled areas in the south.

All these regions are complex. South Brazil, abutting on Uruguay, Paraguay, and Argentina, shares regions with these countries, in familiar style. Here are included humid subtropical grasslands, used for cattle and grain, shared with Uruguay and Argentina, and upland forests shared with Paraguay and Argentina (Fig. 5, page 18). In the middle-latitude farm lands, Brazil is junior partner, but in forest lands Brazil is senior, with most of the Paraná pine timber and the more extensive native stands of "Paraguay tea" (*yerba mate*, or *herva matte*).<sup>1</sup>

Such variety in South Brazil does not prevent some unity. It is the middle-latitude section of the country, esteemed for modern opportunities, and recently settled, with a high proportion of North Europeans,

<sup>1</sup> See footnote 1 p. 425.

particularly Germans and Poles—excuse enough for viewing the South together as one part of Brazil.

The areas northeast of the core region are more conveniently regarded as two regions, both hot in climate and predominantly Negro in population, but otherwise distinct. The Tropical East Coast has chronic heavy rainfall in a broad coastal zone (Fig. 4, page 12). In this hilly forested borderland of the Brazilian highlands, Negro farmers have developed the leading cacao plantation region in America.

Humidity and forest in the Tropical East Coast give way to semi-aridity and semidesert in the far Northeast (Fig. 4, page 12). This is the most crowded (with respect to pressure on supporting resources)

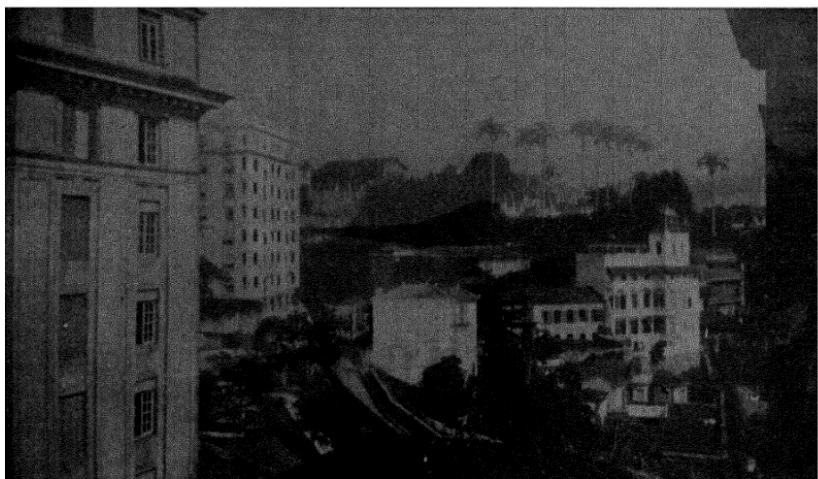


FIG. 403.—Rio de Janeiro, capital of Brazil. A composite impression, May, 1930.

though not the most populous region of Brazil. Occupance has been favored by easy establishment of plantations and subsistence farms—plantations ever since the first settlements in Brazil on the less dry eastern margin, and elsewhere in irrigable tracts of land, and subsistence farms depending on good seasons of rainfall. But plantation sites are limited, and rainfall seasons are undependable; crop failure and famine are common, especially inland and on the dry north coast. Enterprise and population have spread from the Northeast to other regions of Brazil, leaving still in the far Northeast a crowded population dubiously supported by available resources.

The other outlying regions of Brazil are of second magnitude—not in area but in population and national influence. They include the interior uplands (Campos), extensive tropical savannas covering inland parts

## BRAZIL

of the Brazilian highlands, low uplands rather than highlands in altitude, partly grassy and partly wooded, hot and seasonally rainy (Figs. 3, page 11, 4, page 12, and 5, page 13). This is the hinterland of the populous eastern coastal regions, sparsely settled by livestock ranchers in more accessible areas and by free Indians in the less accessible, extending

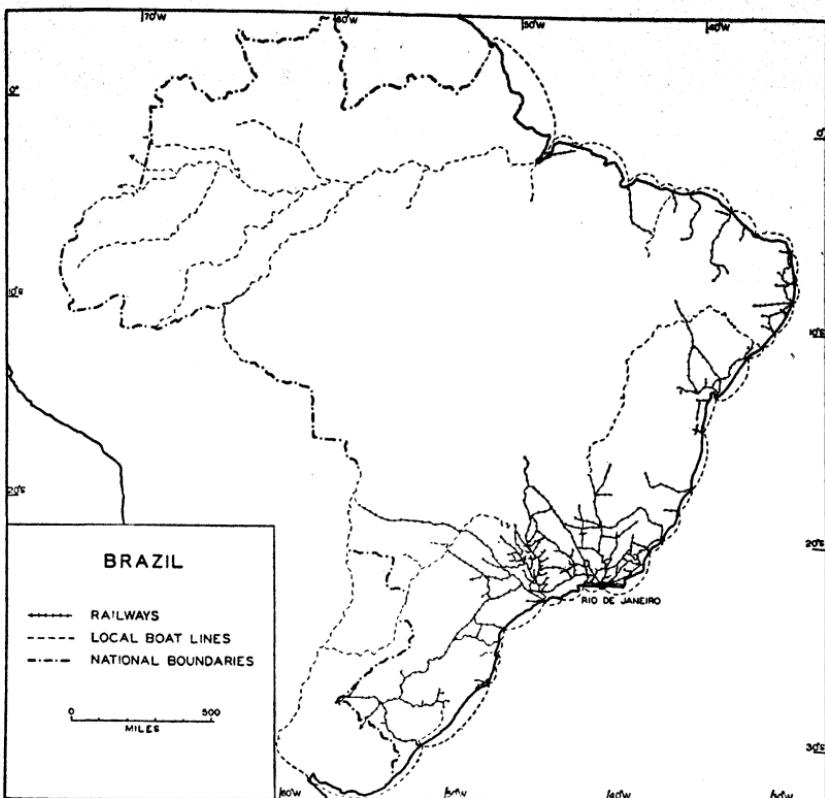


FIG. 401.—Local surface transportation, a coherent national system of land and water routes.

southwestward into Paraguay, westward into Bolivia, and northward to the Amazon forest (Fig. 402).

In the far north and northwest is Brazil's share of equatorial South America, almost as remote for people of the core region of Brazil as for North Americans. The territory includes the largest, most accessible, and most usable portion of the Amazon lowlands and the least used slope of the Guiana highlands (Fig. 402).

**ACTUAL AND POTENTIAL BRAZIL.** The regions of Brazil are tied together by a transportation system already implied in a comparison of

**Brazil and Venezuela.** From the capital and port of Rio de Janeiro (Fig. 403), railways penetrate the central region in an open network, one line extending on across the Campos to the Bolivian border (Fig. 404). Other regions are reached by sea from Rio de Janeiro. The coastwise route to the South is paralleled by a supplementary railway to Uruguay. The coastwise route to the northeast serves as a main line from which short railways penetrate the land and continues on to the northwest as the only Brazilian route to the Amazon—at least, until air lines were extended inland. Air lines in Brazil are relatively important, although they serve mainly places already reached by rail or waterways. Domestic air lines are important because distances are great and surface routes are circuitous. International air lines are important because Brazil is on the lines of transit from both the United States and Europe to the great centers of southeastern South America.

Many maps of Brazil show a site for the future capital of the nation inland near the geometrical center of the country, on the divide between the Amazon and the southeastern coastal rivers, to replace the port capital of Rio de Janeiro on the coast. This implies an ideal objective of full and even development of the national territory, with the capital as the center of an inland empire.

Field observation, however, seems to indicate that the inland ideal is based on theoretical impressions of Brazil as a solid land mass on an outline map, rather than on the realities of modern Brazil and its regions in their water and land relations.

If the idea of inland rearrangement is ever realized, it is likely to be as a different country under other auspices, not Brazil as the heritage and homeland of the Brazilian people. Brazil possesses a great territory of great resources. No other territory in the world not already appropriated by a strong power is so rich in potentialities, either to produce commodities or to support population. Moreover, no country has a more strategic location in respect to world relations, on the southern side of the North Atlantic equidistant between Europe and the United States.

Brazilians have been proceeding normally toward the development of their territory, and they can make Brazil the good country of their desire, if they are given time.

### Field Studies

*In the Core.* Characteristic rural occupancy in the principal regions of Brazil is illustrated by the following field studies. The core region is known for coffee plantations, producing the leading export of the country. The chief area of coffee growing is in the low highlands of the state of São Paulo. The study of a coffee plantation near Campinas, north of the city of São Paulo, is representative of an older part of the coffee region

and illustrates the decline of coffee and the rise of new crops in an old establishment (1). The study in the Marilia District farther west is representative of the new frontier and illustrates the beginning of coffee growing with an accompaniment of other products, for home use or for trade, in a large plantation [2(a)] and in a small one [2(b)]. The growing of cotton, recently increasing in some districts, is not specifically included in the studies; and neither is the common occupancy in small subsistence farms.

Since Colonial times, mining has been important in the core region, particularly for gold and diamonds. Morro Velho is the largest Brazilian gold mine of the present time (3). The same state of Minas Geraes ("general mines") contains the great iron-ore deposits in which exploitation is just beginning.

*In the South.* Of the outlying regions of Brazil, only the South is nontropical. Conspicuous forms of occupancy in the South are livestock farming in grassland areas and timber and mate production in the forest areas. A poor sort of livestock ranching is represented by the study of Fazenda Arenão [4(a)], more akin to cattle establishments of the interior Campos than to the middle-latitude livestock and grain farms of Rio Grande do Sul, farther south near Uruguay and Argentina. Mate production is represented by Herval Clock [4(b)], a smaller establishment than the average in the region.

*East and Northeast.* The Tropical East Coast is a region of forest clearing and cacao planting. Clearing and planting began on a small scale, as indicated in the study of Muniz [5(a)] and has proceeded toward consolidation of small units into large establishments, as indicated in Fazenda Boa Sentença [5(b)].

Northeastern Brazil is noted for the struggle against drought and for precarious support of a large population from meager resources. The recent rise of cotton production has helped to support some people. Fazenda São João is a cotton plantation in an irrigation project (6). The description of a carnauba grove illustrates the use of a special resource localized near the coast [7(a)]; and the account of *jangada* fishing [7(b)] is a further illustration of intensive small-scale use of available resources, by such means as are characteristic in general not only of Northeast Brazil but also of other shores of Brazil and other shores of Latin America from Mexico to Chile.

*Far Interior.* The Amazon lowlands are of small present importance but are large in area and in future possibilities and distinctive in occupancy. Extensive forests, small localized grasslands, widespread extractive activities, many small farms, and a few large plantations—these are common characteristics. The field studies are in a series, beginning near the mouth of the Amazon and proceeding upstream.

The most prominent grassland area is on Marajó Island at the mouth of the Amazon. Cattle ranching here is illustrated by the study of São Sebastião (8). Forest settlement on the mainland near the mouth of the Amazon is illustrated by the study of a small farm clearing (9). The greatest plantation project in the region, now of critical significance, is that in the Ford rubber concessions four or five hundred miles up the river (10).

A variety of occupancy appears in the vicinity of Manaus, near the confluence of the Rio Negro and the Rio Solimões, 900 miles upstream. The gathering of Brazil nuts in forest areas upstream is an important seasonal activity for which Manaus is the trade center. Castanhal Manaus is not a typical source of Brazil nuts but is an unusual experiment, to introduce plantation production as a substitute for forest gathering [11(a)].

Forest clearing on a small scale, as at the mouth of the river, is illustrated by Cordero [11(b)]. Dairy farming of a sort typical only near the few Amazonian centers of population is illustrated by Fazenda Boa Fortuna [11(c)].

Fishing at the Boca Negro is of a sort typical in detail only of certain places but representing in a general way river fishing up and down the Amazon and in other rivers of Latin America [11(d)].

Farther up the Amazon, toward the western border of Brazil, occupancy is more scattered and less varied: forest gathering is the main source of commercial production, and trading posts are the principal centers of activity. The study of Jauató indicates the character of an ordinary post and the range of its forest and river activities (12). Perpetuo Socorro, farther upstream, differs in only a few important ways, in having more Indians in its forest population and in lying close to the Brazilian frontier (13). Here the close relation of western Brazil to eastern Peru and the eastern lowlands of the other Andean countries again appears, and the field studies end in the region of greatest international partition, where common interests and common problems are shared by five nations, of both the eastern and the western sides of South America.

### 1. CHAPADÃO<sup>1</sup>

#### AN OLD COFFEE FAZENDA IN THE SUBTROPICAL CORE REGION

The coffee region of São Paulo occupies about 1 per cent of the area of the nation. This region is known as a part of Brazil where conditions peculiarly favorable for a great specialty

crop coincide with conditions suitable for white settlement and civilized life.

The form of the coffee region reflects the advance of a frontier. A century and a half ago, coffee was an experi-

<sup>1</sup> Field work in April, 1930. R. S. PLATT, Coffee Plantations of Brasil, *Geographical Review*, Vol. 25 (1935), pp. 231-236.

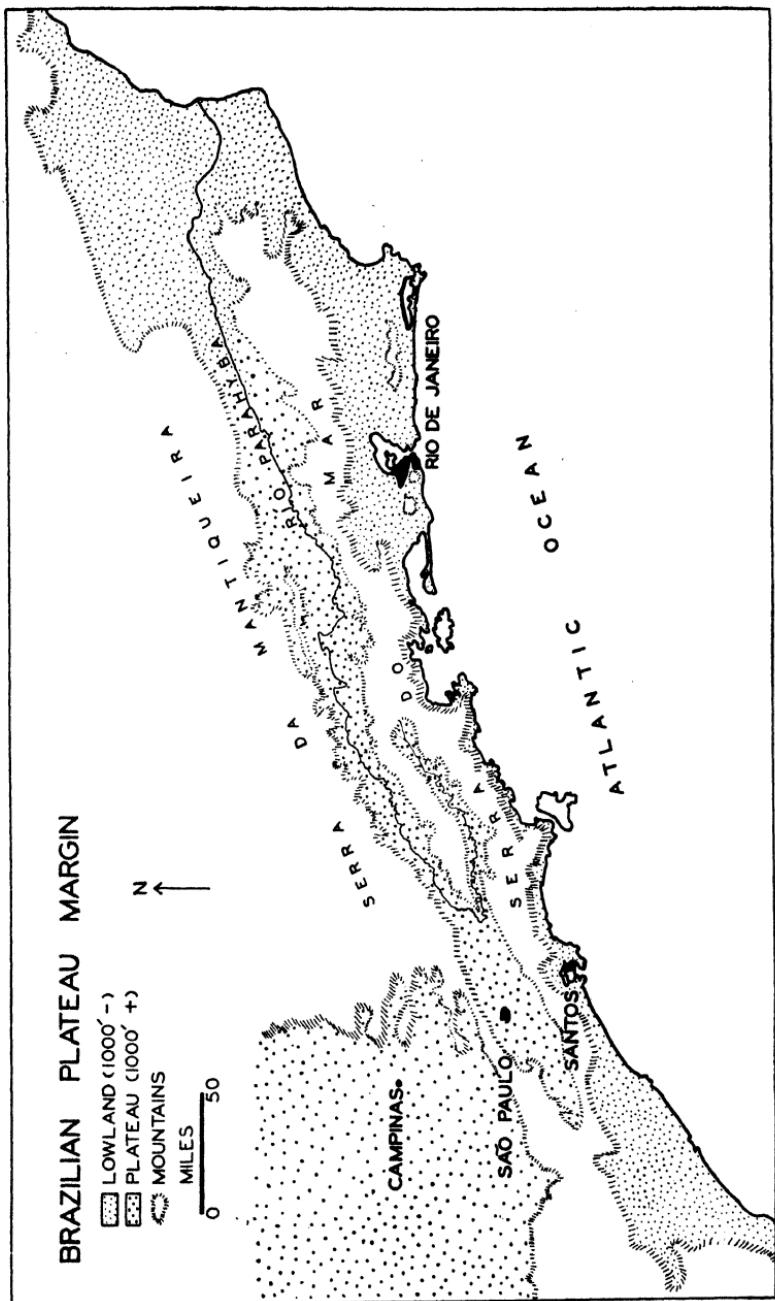


FIG. 405.—Coastal lowlands, escarpments, and near-by plateau areas of the core region. (Based on sheets of Club de Engenharia do Rio de Janeiro, "Carta internacional do mundo ao 1,000,000," Edição Provisória, 1922.)

mental crop on coastal lowlands near Rio de Janeiro and Santos, narrowly confined between the sea and the escarpment

still forest-clad and unproductive, coffee began to flourish in the more congenial trough behind the coast

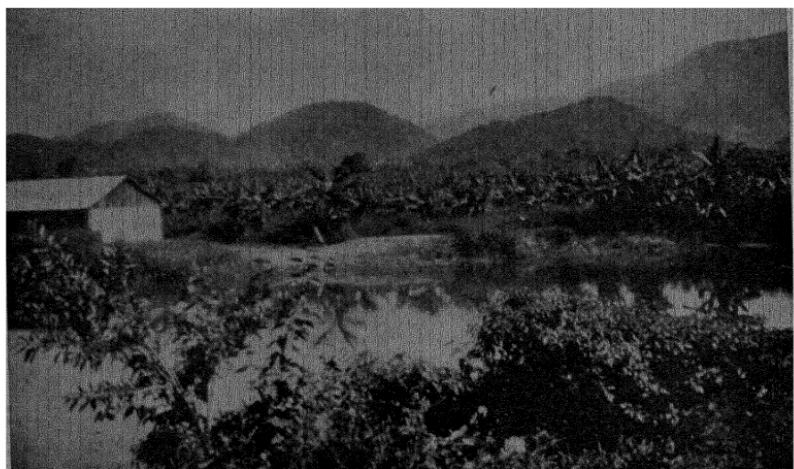


FIG. 406.—A banana plantation in coastal lowlands, near Santos. Tidewater in the foreground, escarpment in the background.



FIG. 407.—A coffee fazenda southeast of Campinas. Plantation of older coffee bushes on slopes and ridge tops. Headquarters buildings, laborers' houses, grass pasture, and supply crops in valley bottom. Young bushes indicating some recent planting even in this older part of the São Paulo coffee region.

of the Serra do Mar (Figs. 405 and 406). Then, leaping the first mountain barrier, whose rugged seaward slope is

range, particularly in the valley of the Rio Parahiba, where there are slopes and terraces more than a thousand

feet above the sea. Here plantations still persist. But this also is a narrow strip of mountain-bound land.

The trough extends southwestward beyond the head of the Rio Parahiba, though here it is hilly and infertile. This unproductive section, where the

within the tropics, two or three thousand feet above the sea, hot and humid in summer, warm and less humid in winter, diversified in soil, cut by stream valleys leading northwestward to the Rio Paraná, toward which the plateau surface gradually descends (Fig. 408).

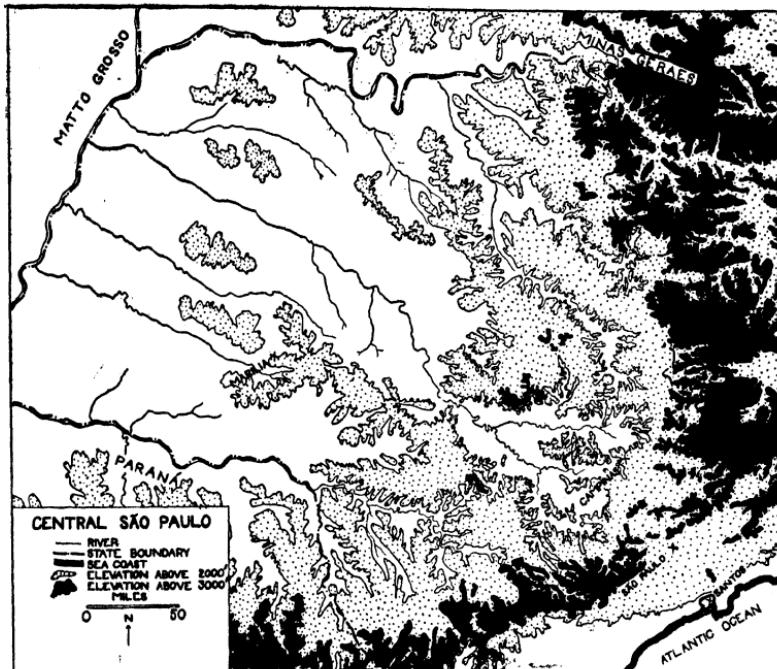


FIG. 408.—Relief and drainage pattern in the low highland area of São Paulo. Campinas and Marilia study sites. The Rio Paraná borders the state of São Paulo on the northwest, adjacent to the state of Mato Grosso. The name "Paraná" on the map refers to the state of Paraná, adjacent to São Paulo on the southwest. (Based on sheets of Club de Engenharia do Rio de Janeiro, "Carta internacional do mundo ao 1,000,000," Edição Provisória, 1922.)

city of São Paulo now stands, is opposite a low and narrow part of the Serra da Mantiqueira, giving easy access to the least rugged and most fertile part of the highland region beyond the mountain ranges (Fig. 405).

Here, a century ago, coffee leaped the second mountain barrier and established itself in the Campinas District [Figs. 402(1) and 407], the threshold of a region of rolling uplands just

Coffee planting spread northward and westward from the Campinas District, extending along railway lines as they advanced, expanding in favorable areas of fertile, rolling land (Fig. 409). Toward the north, it has practically reached the limit of good land near the state boundary; toward the west, it has been recently advancing along projections of the upland between tributaries of the Paraná. Details of

the present pattern of occupancy in this region are illustrated by reconnaissance studies of plantations in two areas—at the old threshold of the region in the Campinas District and on the new frontier in the Marilia District.

FAZENDA CHAPADÃO is typical of the Campinas District, though some-

four thousand acres and occupies approximately the basin of a small stream (Fig. 412). The ridge slopes are gentle, and the soils are moderately fertile, deep brown silt residual on old crystalline rock. Coffee occupies 620 acres on the ridge tops and upper slopes around the headwaters of the stream. The rest of the land is rela-

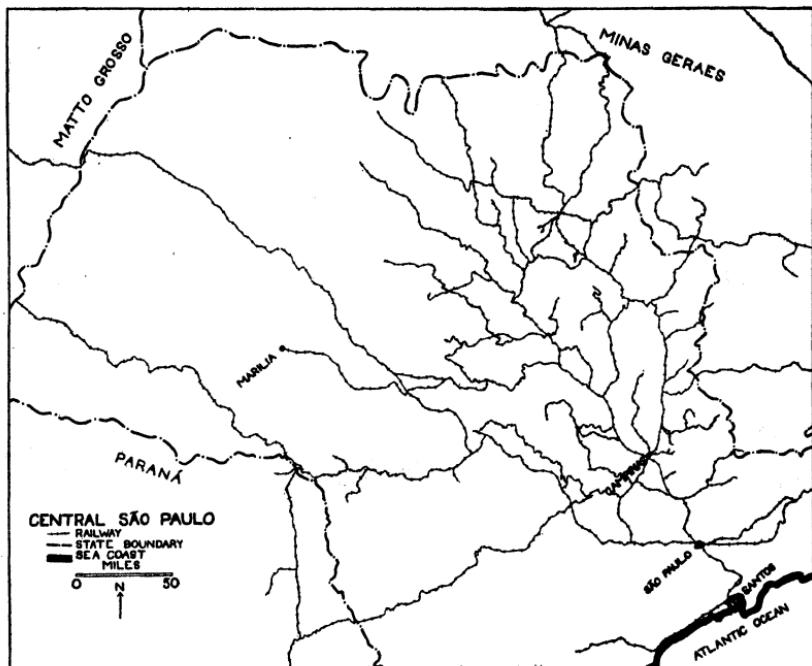


FIG. 409.—Railway pattern in the low highlands of São Paulo. Campinas and Marilia study sites. (Based on *Inspectoria Federal das Estradas, "Mappa da viaccão do estado de São Paulo, 1:1,000,000," Rio de Janeiro, 1928.*)

what larger than the average plantation and somewhat better managed—still well kept up and productive after more than eighty years of operation. A corner of the property overlooks the local market town of Campinas, nestling in its valley; motor road and railway connect it with the regional metropolis, São Paulo, 65 miles away, and with the port of Santos, 114 miles away (Figs. 410 and 411).

The property has an area of about

tively low and is considered unsuitable for this crop because of poor soil drainage and frost danger due to inadequate air drainage. Both reasons seem to be valid, though the practice of avoiding lower slopes tends to be followed simply as a matter of custom. However this may be, the practice leaves space for supply crops apportioned to resident workers for family support, for pasture for the plantation livestock, for woodland, planted on

slopes and growing wild on the flood plain, to supply fuel and small timber, and for curing operations.

The small stream is dammed to form reservoirs providing water for cleaning the crop by the wet process. Beside it are the well-equipped plant

because it separates the ripe berries from the unripe and the overripe—a mixture caused by the Brazilian custom of harvesting the whole crop at once by stripping the plants.

On the slope above the cleaning plant are rows of workers' houses. Work is



FIG. 410.—A downtown street in São Paulo.

and paved drying floor. This installation indicates a degree of modernization, for the wet process requires more equipment and produces a better product than the older dry process still used for a large part of the Brazilian crop. Anomalous though it may seem, the wet process does not make coffee of as good aroma and yet is likely to produce a better average product than the dry process,

done according to the *colono* system, in which the plantation is divided and allotted to workers (*colonos*) to be cared for. About a hundred *colono* families are required at Chapadão. Facing these houses, on the opposite side of the valley, are the owner's residence and offices. The owner is a wealthy Brazilian who lives in the city of São Paulo and leaves details of management to an administrator.

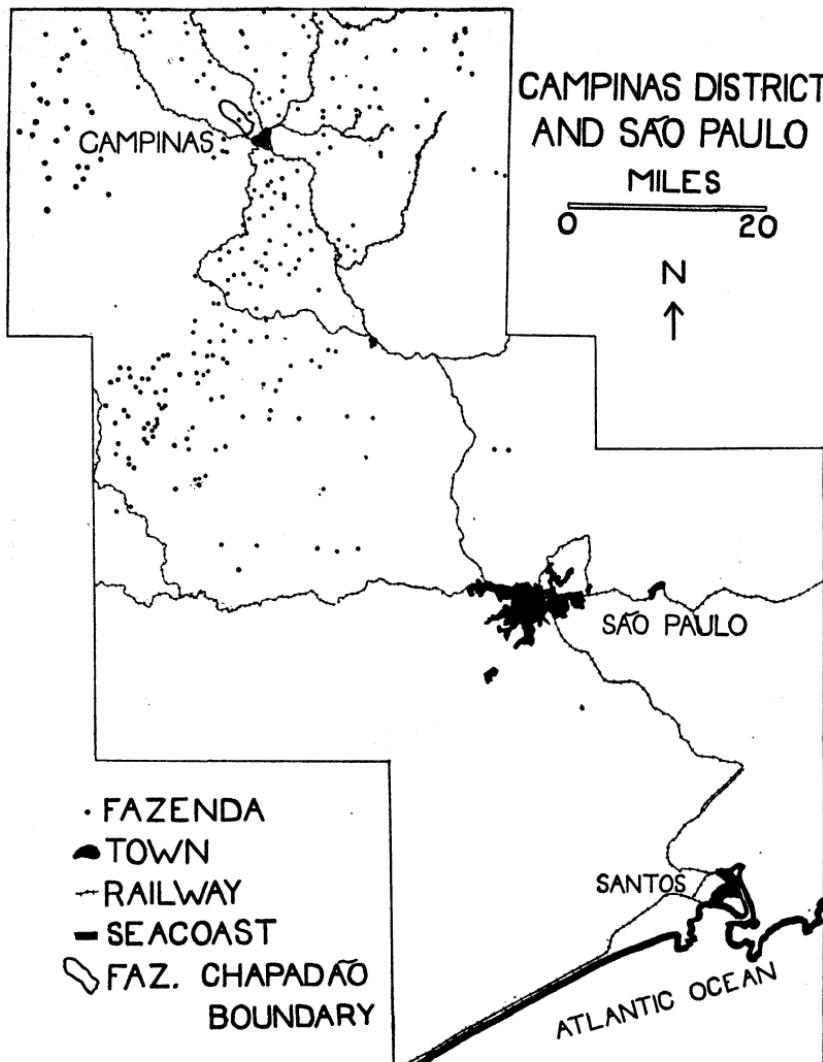


FIG. 411.—Fazendas indicated by a dot for each headquarters site. Concentration in the Campinas District separated from the city of São Paulo by a low mountain area (Fig. 408). Fazenda boundaries indicated only for Chapadão. (Based on sheets of Comissão Geográfica e Geológica do Estado de São Paulo, "Estado de São Paulo 1:1,000,000," 1925, and "Carta dos excursionistas 1:200,000," 1923.)

The coffee is of Arabian type, grown without shade in the customary Brazilian manner. Probably the reasons for this custom are less mandatory than are those for avoiding valley bottoms. The coffee plants are grown in clumps of three or four instead of

mentary vegetation to hold the soil or leguminous crops to enrich it. Furthermore, the Brazilian style of planting has prevailed under conditions of human settlement involving unrestricted expansion on virgin land, whereas the shade-tree method of the

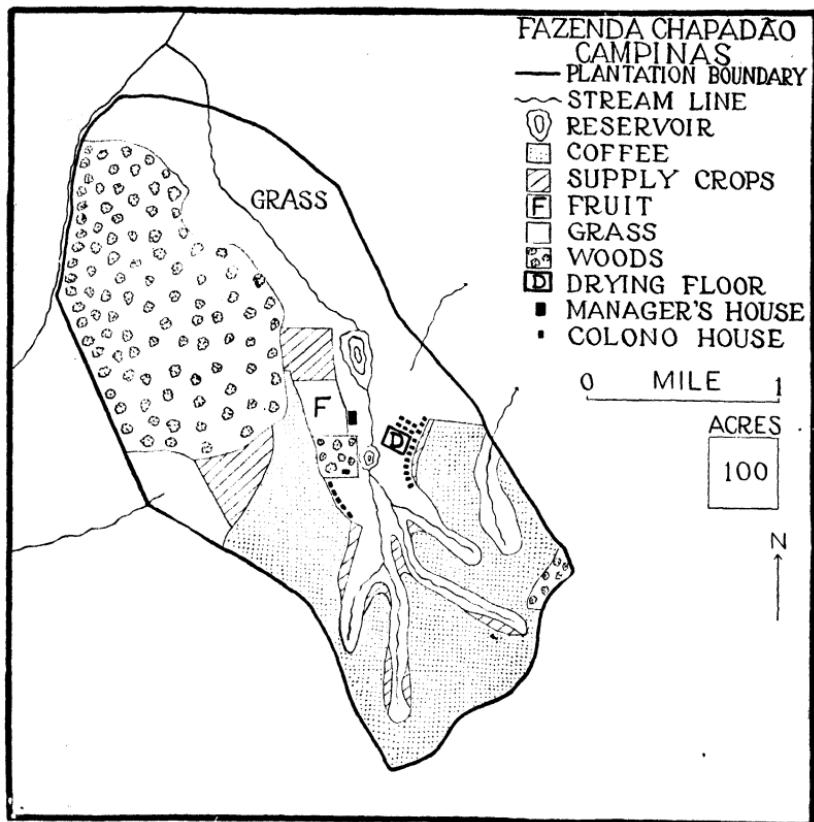


FIG. 412.—Land use in an old coffee plantation.

singly as in other regions. Probably coffee growth is more vigorous and healthy without shade. Injurious insolation, excessive desiccation, and destructive winds are infrequent in this district, in contrast with some regions in lower latitudes, at lower altitudes, or in storm tracks. Here also gentle slopes and good soils have favored planting, without the need of supple-

Caribbean region, for instance, has been used in some districts rather in response to conditions of restricted land area and depleted soils.

Now that Chapadão is an old plantation, some shade might be beneficial. Many old coffee plants produce most of their leaves and all their fruit close to the ground, as if the tops had been sacrificed in sheltering the lower

branches (Fig. 413). In competition with the new lands of the coffee insect pest that has invaded the Campinas District in recent years and

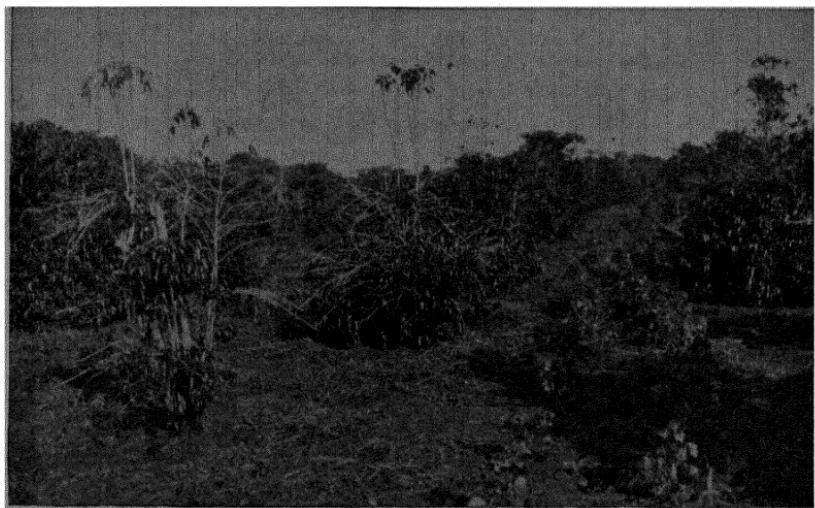


FIG. 413.—Old coffee bushes with tops dead except for a tuft of leaves, Fazenda Chapadão. Beans, *colono* supply crop, growing between rows at right.

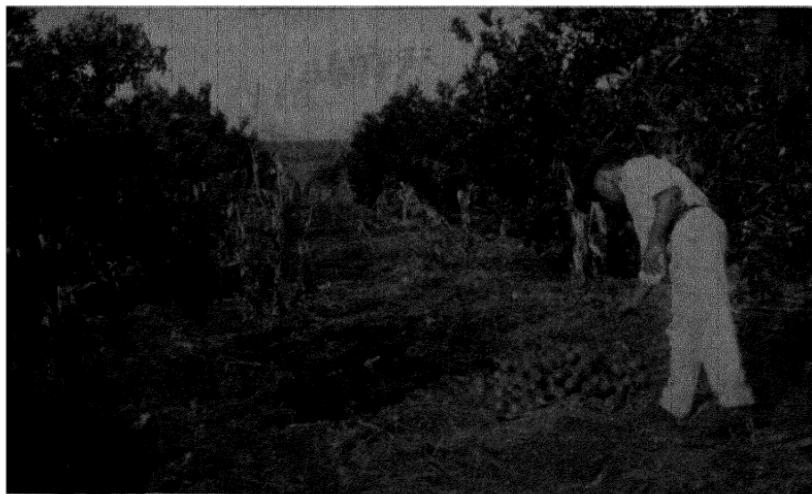


FIG. 414.—Orange grove, Fazenda Chapadão. Corn, *colono* supply crop, growing between rows of trees.

frontier, Chapadão is handicapped not only by old plants and soil depletion but also by the coffee weevil, an

is controlled only at considerable cost. Diversification or complete change of production is under consideration.

Many other products grow well on the plantation. The chief crops raised by the *colonos* on their allotted fields are corn, beans, and bananas. Bananas produce well for home supply, but they cannot compete on a large scale with the product of the coastal lowlands (Fig. 406). For commercial production of other fruits, however, the Campinas District has advantages. At Chapadão, 60 acres of the lower slope near headquarters have been devoted in an experimental way to various fruits—

pears, peaches, mangoes, pineapples, grapes, oranges, and grapefruit. Oranges have already proved successful as a product of the district and are marketed through city establishments (Fig. 414). They are shipped to Argentina for an early-season market and to Europe for an off-season market from May to October, when Northern Hemisphere oranges are not available.

So much for the old plantation—its present unsettled, its future uncertain. Now for the frontier.

## 2. MARILIA<sup>1</sup>

### NEW COFFEE FAZENDAS IN THE CORE REGION

#### a. MIRANDA, A LARGE PLANTATION

Marilia is at the end of one of the railways advancing to the west, a railway of importance for coffee extension because it follows one of the projecting ridges of the plateau [Figs. 402(2), 408, and 409]. The 350-mile journey from São Paulo requires 16 hours. Marilia sprang into life a few months before the arrival of the line, as a trade center for the ridge district, a frontier boom town. Several roads reach out from Marilia into new land. A few miles northwest of the town, in the midst of virgin forest, is the Fazenda Miranda, occupying the basin of a small stream.

The original property had an area of 150,000 acres, but most of this was subdivided for sale, and only about a thousand acres were reserved for the owner's plantation (Fig. 415). Although it is defined by the straight lines of a rectangular survey instead of by metes and bounds, the form of the plantation is much like that of Chapadão. The soil is much lighter than at Chapadão, distinctly sandy, overlying sandstone.

Coffee occupies 250 acres on the ridge tops and upper slopes, and more similar land is still available for coffee

planting. There are low fields of grass pasture as at Chapadão, but at present there are no separate fields of supply crops, the *colonos* growing their supplies between rows of coffee in the plantings. Two fields of sugar cane for livestock fodder and a small orchard of pears, oranges, and pineapples for home supply complete the crop list.

Brick houses for the owner and the administrator have been built on a ridge overlooking the valley (Fig. 416). The owner is a Brazilian physician who lives in the city of São Paulo. The resident administrator is of Spanish birth. Workers' huts are scattered near some of the plantings. Labor is scarce and hard to keep, so that there are only eight settled *colono* families and additional transient labor has been required.

Each year a tract of forest gives way to coffee. The forest is of subtropical mixed hardwoods, mostly evergreens. Trees are felled at the beginning of the drier season. Toward the end of the season the area is burned over to dispose of brushwood, and when the summer rains begin coffee is planted, several seeds in each carefully prepared

<sup>1</sup> Field work in April, 1930. *Ibid.*, pp. 236-239.

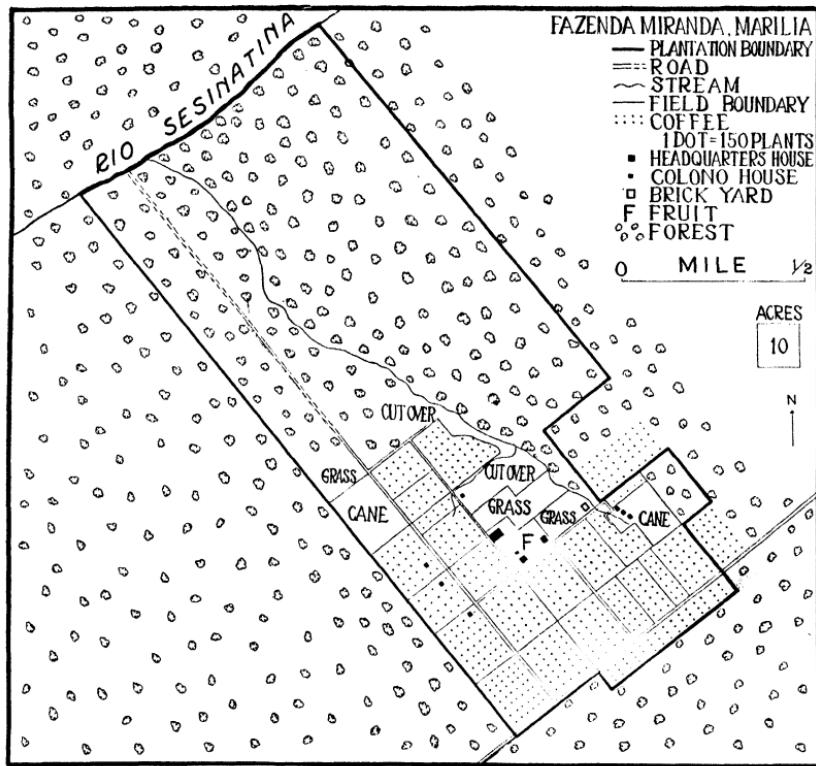


FIG. 415.—Land use in a new coffee plantation.

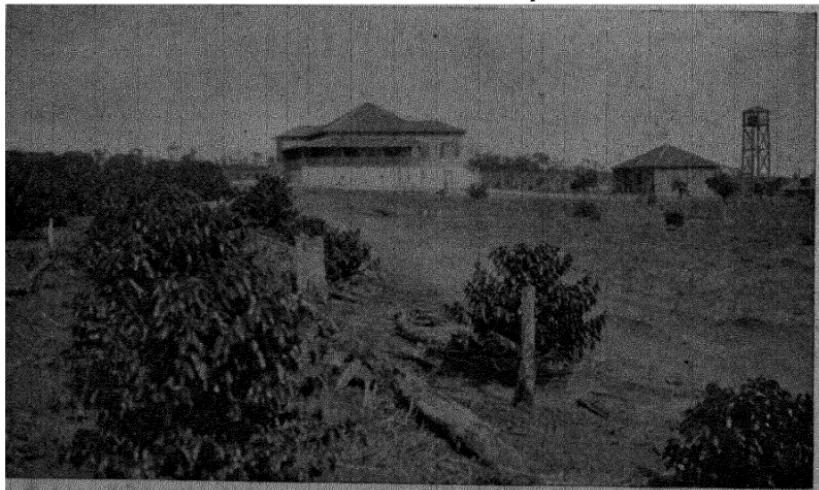


FIG. 416.—Owner's house, on a slope overlooking the valley, Fazenda Miranda. Coffee 3½ years old at left; fruit orchard at right.

hole. Some of the fallen timber remains for several years, but by the time production begins it is not in the way.

No cleaning equipment has been installed as yet, but before long it will be needed.

#### b. POLLAN, A SMALL PLANTATION

In the district there are some plantations of a different type. One of these is the Fazenda Pollan, which has an area of only 125 acres but, like the others, occupies the head of a

clumps of the frontier (Fig. 418). Wider spacing of plants has been adopted in the new plantations and has resulted in fewer plants to the acre but in fuller growth individually. At

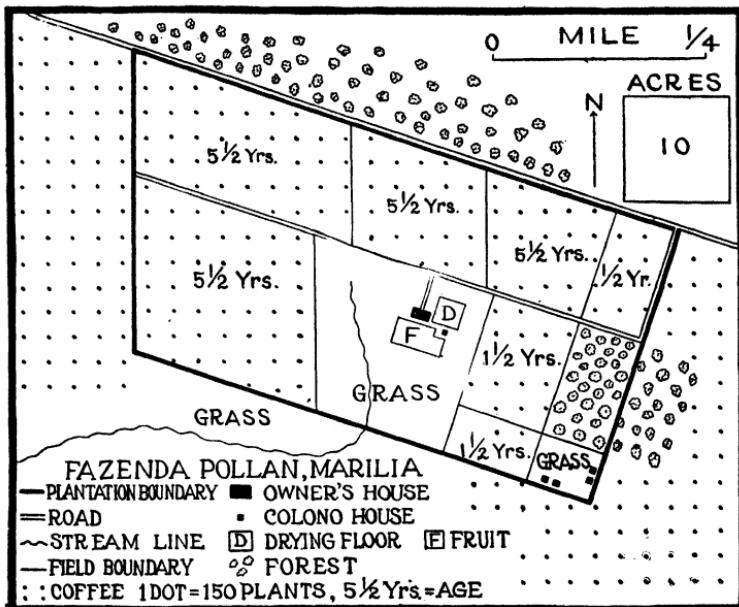


FIG. 417.—Land use in a small coffee plantation.

small drainage basin (Fig. 417). The owner, an Italian immigrant, lives and works on the plantation. There are four houses belonging to *colonos*. A patch of forest has been left to provide firewood and small timber. The proportion of land suitable for, and occupied by, coffee is greater than on the Fazenda Miranda—80 acres, two-thirds of the property.

The most advanced coffee plants here are  $5\frac{1}{2}$  years old. No need of shade trees is indicated in these vigorously growing and producing

the Fazenda Pollan, as at the other plantations, there is interplanting of supply crops with coffee. Here there are also some temporary money crops, probably more characteristic of a small plantation started with small capital than of large, highly capitalized enterprises. One of these crops is tobacco, and another, of greater importance, is upland rice, so commonly planted on the young plantations that rice is temporarily the most conspicuous product of the district (Fig. 419). In the town of Marilia the several

commercial cleaning and drying establishments (*beneficios*) are engaged mostly in handling rice rather than

good for lumber, and much of the forest is cleared without any recovery; but there is enough incidental pro-



FIG. 418.—Coffee 5½ years old, Fazenda Pollan. Trash raked between rows, fallen coffee berries on the clean ground under bushes.



FIG. 419.—Coffee 1½ years old; upland rice between rows; remnants of forest timber left after felling and burning; a small tract of standing timber, wood lot of Fazenda Pollan, in right background.

coffee, for volume production of the latter has hardly begun.

Not many of the forest trees are

duction to provide work for several sawmills in Marilia in making lumber for the new town and for old markets

reached by the railway. The end of the railway is fairly buried under piles of fuel for the wood-burning engines.

These aspects of the frontier are temporary. Plans and expectations have assumed that the frontier itself is temporary, that the railway will soon proceed on its westward advance accompanied or preceded by establishment of new plantations and new towns. The present terminus is 140 miles from the Paraná Valley. Much fertile ridge land lies beyond Marilia, land somewhat lower, but not too low for coffee (Figs. 408 and 409).

The very structure of the coffee-industry has been founded on advance into new land: the *colono* system of plantations, methods of planting and harvesting, objectives in marketing, public promotion—all have been shaped with reference to establishment of new plantations rather than maintenance of old ones.

So hasty has been the advance and so strong the spirit of bonanza production that only highly attractive areas have been occupied. Within the frontier of the coffee region, less than 20 per cent of the land is devoted to coffee, and even in the districts of intensive coffee specialization less than

40 per cent is so occupied. The present area of production, 5,700 square miles, is only 5 per cent of the area of the state of São Paulo and less than half the potential coffee land in the state. Thus, as far as land is concerned, the process of expansion may continue for many years.

Another factor has appeared. The present coffee-producing area is seemingly small for the premier source of a prominent world crop; but it is not small in fact for a crop of high yield per acre and low consumption per capita. In spite of the fact that coffee is a crop of narrowly specific requirements limiting it to fertile spots in low-latitude highlands, not many such spots are needed to satisfy the world market, and Brazil has no monopoly of them. Consumption, not capacity for production, appears to limit the industry.

Perhaps the era of expansion is at an end. In view of world-wide dislocation in general and the failure of Brazilian coffee policy in particular, the coffee region may retain its present form for many years to come, its gaps unfilled, its frontier unchanged. Marilia may grow old and still remain a frontier town.

### 3. MORRO VELHO<sup>1</sup>

#### A GOLD MINE IN THE CORE REGION

On a hillside of the Brazilian plateau in the state of Minas Geraes is an outcrop of gold ore [Fig. 402(3)]. The mineralized vein structure outcrops over an area 100 feet wide and 1,000 feet long, and extends downward at an angle of 45 degrees in weak metamorphic rocks (Fig. 420). Mineralization is irregular; but the structure as a whole is persistent, and the average content is quite uniform—0.003 of 1 per cent of gold, about two-thirds of an ounce per ton, worth \$14.50 (United

States old style); and 0.001 of 1 per cent of silver, worth about 14 cents per ton.

**UNDERGROUND.** Morro Velho is an old mine. Open-pit digging on the outcrop has been long forgotten, and for a century the mine has been developed systematically by a British company.

Mining has progressed by a series of vertical shafts and crosscuts reaching the vein at ever greater depths down to 6,000 feet (Fig. 420). Beyond that point

<sup>1</sup> Field work in May, 1930. R. S. PLATT, Mining Patterns of Occupance in Five South American Districts, *Economic Geography*, Vol. 12 (1936), pp. 342-344.

the dip of the vein decreases to less than 15 degrees, and an incline is one of the deep mines of the world and bids fair to become the deepest. Ex-

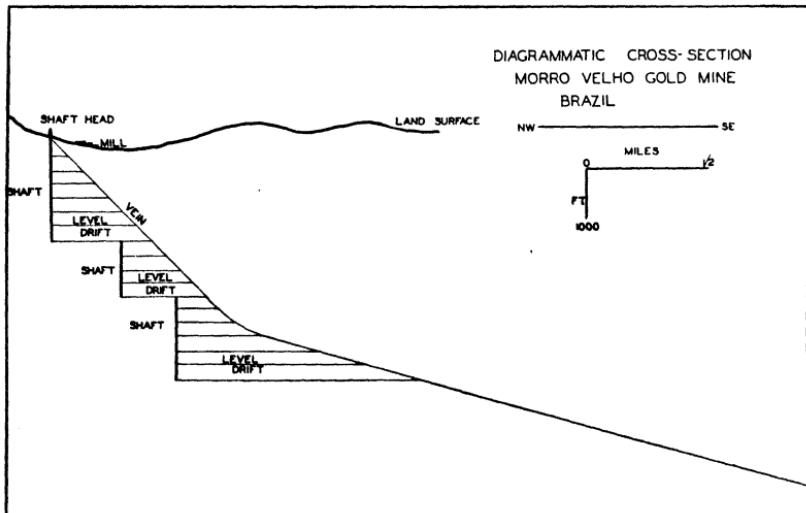


FIG. 420.—Vertical section of a deep gold mine.

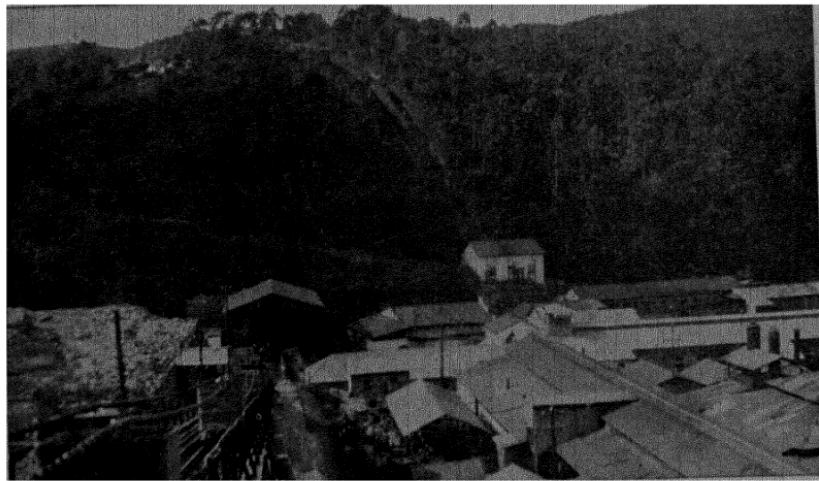


FIG. 421.—Morro Velho Mine. View from top of mill looking east. Mine entrance at foot of slope; ore cars coming up incline at left near by, waste piles beyond incline at left, mine and mill buildings at right, hoist cables on wooded hill in background.

substituted for a vertical shaft, continuing down to about seven thousand feet. Thus Morro Velho has become

traction in the stopes is by cut and fill, a method impelled by the attitude and weak walls of the deposit, and involv-

ing the introduction of filling material from the surface to replace the ore removed. Daily, 600 tons of ore are hoisted to the surface.

**ABOVEGROUND.** The mine mouth is on a green hillside in an open valley (Fig. 421). Close by is space for shops and storehouses. Miner's dwellings are here, also, in a pleasant town. This is within easy walking distance of the mine, but the great distances underground necessitate a daily journey of

and the product of silver to form one brick every 10 days, worth about \$600. Railway and highway connect the mine with the outside world. Thus the pattern of the mine and associated establishments is advantageously arranged aboveground, the disadvantage of great depth being evidently not a primary misfortune, but a result of long-continued activity in a great deposit.

**SURROUNDINGS.** The functioning of the mine has been favored no less by

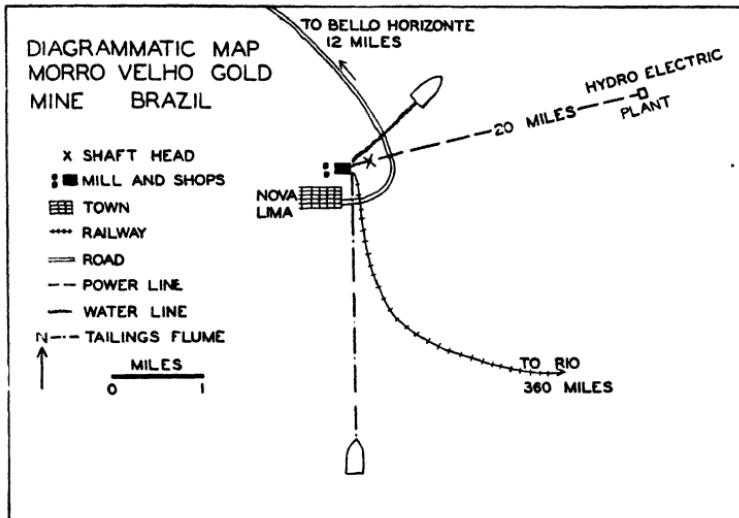


FIG. 422.—Lines focusing on Morro Velho Mine.

an hour to reach the lower levels and an hour to return home. Near the mine mouth, there is also space for preliminary sorting and waste piles of discarded rock. Here is a gentle slope for the stamp mill arranged for gravity passage of ore and separation of all of the 99.99 per cent of waste matter, by gravity, cyanide solution, and smelting. The pulverized waste rock, 600 tons a day, is washed out in the tailings flume and deposited at a convenient place in the valley (Fig. 422).

The product of gold accumulates to form one brick every 3 days, a brick weighing 88 pounds and worth \$20,000;

regional circumstances than by site conditions. At 2,800 feet elevation above the sea the rolling plateau, with moist subtropical climate, fairly accessible from the outside world, is a favorable place for human life and activity. Aboveground temperatures are suitable for work and for the growth of plants all year. Belowground depth appears again as a handicap, the temperature near the bottom of the mine being more than 110°F. This difficulty is being met by the installation of electric refrigeration at a depth of 6,000 feet.

Labor supply is no great problem here. Over the hills and valleys of the

plateau are scattered farm lands supporting a moderately dense population, engaged mainly in subsistence agriculture, not preoccupied by commercialization. It is not difficult for the company to obtain and provide for 3,000 miners and millworkers and 100 executives and technicians from Europe and North America.

In this productive district, food is abundant and cheap. Wooded hills on company property provide timber. A neighboring valley provides water. A more distant river, still on mine property, provides power, for compressed

air drills, for miles of electric hauling and hoisting, and for the mill. The district does not provide fuel other than firewood, but rail transportation from the coast is not too expensive for fuel oil, needed to smelt the diminutive metallic output of the mill.

Export of the gold product is by the same route. About once a fortnight when six gold bricks have been produced, these are taken under guard on the railway to Rio de Janeiro and there delivered at the dock to a steamship company for shipment to the North Atlantic.

#### 4. PONTA GROSSA IN THE SOUTHERN UPLANDS<sup>1</sup>

##### a. ARENÃO, A CATTLE RANCH

In every direction from the town of Ponta Grossa, state of Paraná, a rolling plateau stretches away to the horizon, subtropical campos in which grass covers the broad rounded ridges and clumps of trees occupy the heads of valleys [Fig. 402(4)]. The elevation is about three thousand feet above the sea. Local relief from ridge tops to valley bottoms in the dendritic pattern of dissection is about three hundred feet. The climate is subtropical, with 9 months of summer heat and only occasional light frosts in the cool season. The annual rainfall is about thirty-five inches, concentrated in the hot season and leaving the cool season relatively dry but not dry enough to cause a general fall of leaves. The plateau is underlain by red sandstone, and the soil is sandy and red.

**PATTERN.** Fazenda do Arenão is an establishment apparently typical of the plateau. The owner is a wealthy resident of Ponta Grossa. The property is a triangle 12 miles long and 9 miles wide, 50 square miles in area, bounded along one margin by a small river and along another margin by a road traversing a broad divide 300 feet higher than the river valley (Fig. 423).

Tributary streamlets cross the property, heading near the road and emptying into the river, thus dividing the area into several rounded ridges between V-shaped ravines, in which there is a little water even in the dry season.

The name of the establishment means "farm of the sand." The soil is distinctly sandy, and sandstone outcrops in the stream beds.

The ridges are mantled with grass, brown and harsh in the dry season, green and succulent through the rest of the year. Bushy growth appears in places but is kept down by annual burnings, which serve to bring out the tender shoots of new grass. Possibly fire is responsible for these campos. In the ravines, clumps of trees maintain themselves here and there, moist and shady even in the dry season.

Most of the property is in one open pasture, 40 square miles in area, bounded by the river on the west and by wire fences north and east. Almost all the remainder is in several smaller pastures located to take advantage of road and railway fences along the upper margin of the property. Even these pastures are not small according

<sup>1</sup> Field work in April, 1930.

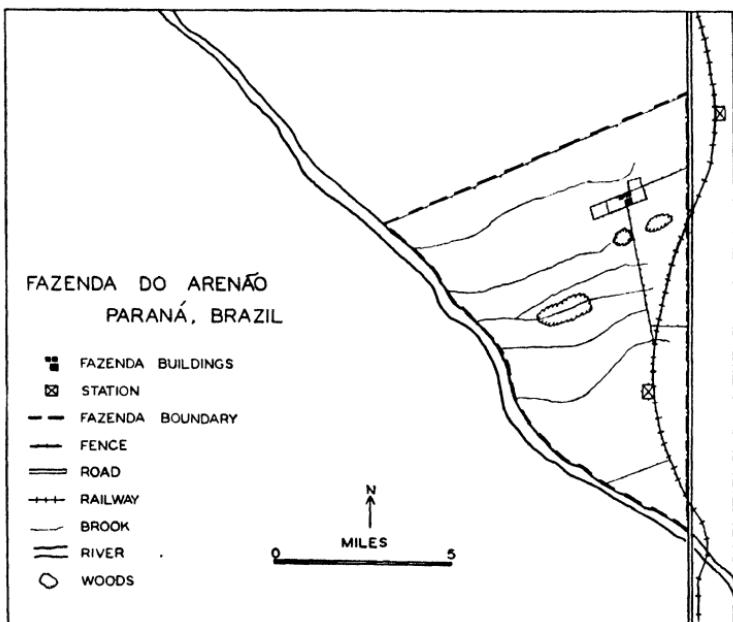


FIG. 423.—A cattle ranch in the southern uplands. Natural grassland (savanna) occupies the area, except for the small woodland groves and small enclosures at headquarters.



FIG. 424.—Cattle grazing in natural grass pasture, Fazenda do Arenão. View looking east, upstream, near the head of a ravine. A single Paraná pine, perhaps the last of a grove, at right. Mixed woods occupy the bottom of the ravine farther downstream.

to common standards—1,000 acres or more in area (Fig. 424).

One spot remains to be accounted for, an enclosure of less than 40 acres for the central headquarters of the establishment, subdivided into small fields and corrals and containing a group of houses and sheds (Fig. 423). This is located on one of the rounded ridges well within the property on the side toward the road and railway.

fazenda is on the only railway northward to the heart of Brazil, it is in a position to receive cattle on their way to market from a great area of grazing lands extending westward and northward for 300 miles. There is a meat-packing plant at Ponta Grossa. Thus Fazenda do Arenão is better suited for fattening than for breeding, in respect both to location and to seasonal grazing conditions. The rela-



FIG. 425.—Cowboys on mules, Fazenda do Arenão. Cattle grazing in the background. View looking southwest over upland surface.

**FUNCTION.** The establishment functions as a cattle-breeding and -fattening ranch manned by 10 cowboys mounted on mules (Fig. 425). The basis of production is the natural grass pasturage. The animals grow and fatten in the rainy season, especially during the first 4 months when the grass is tender, then subsist through the dry winter kept in pasture on the lower land near the river. The number of steers carried over the winter is about one thousand, an average of one head in 30 acres.

Three times as many can be fattened in summer; and if the market promises well, animals are bought for this purpose, driven in from western Paraná and from Mato Grosso. Because the

tive small number of animals carried over the winter indicates as much. Other fazendas in the vicinity specialize in fattening and do not breed and carry steers through the winter.

The animals are of low grade for beef purposes. Most of those from the western ranges are of the native long-horned stock. Local breeding has been at least partly for the purpose of improving quality by introducing better blood. But under local subtropical conditions without elimination of ticks, Shorthorn and Hereford cattle are not sufficiently resistant, and the zebu strain that has been used has maintained hardihood without improving the meat-producing characteristics (Fig. 426).

The yearly crop of calves numbers about seventy, and this is not likely to be increased unless an easy method of improvement is discovered. In addition to the steers there are 100 cows, 100 sheep, 50 mules, and an

the dry season. Extension of agriculture is not encouraged by either soil or climate.

The groves of trees in the ravines are useful for shade rather than for wood. They contain a few Paraná pines

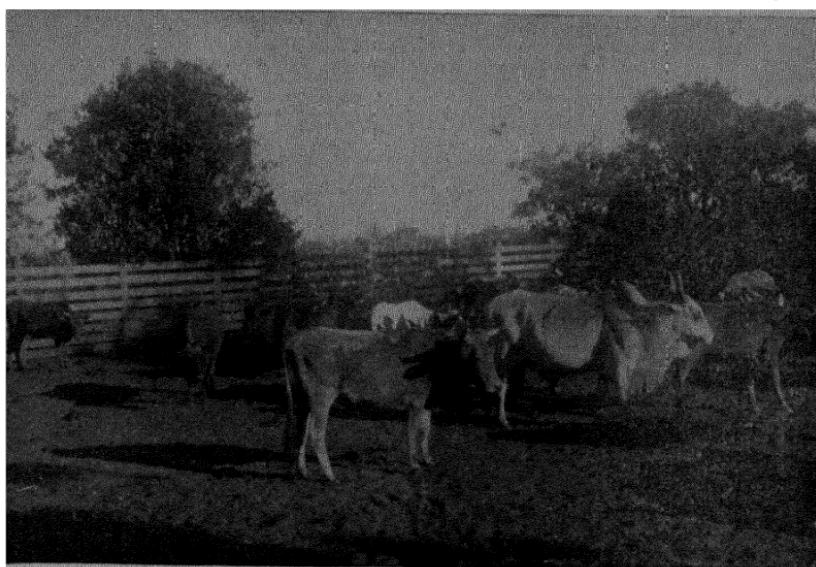


FIG. 426.—Corral at headquarters, Fazenda do Arenão. Zebu and *criollo* cattle. Small cornfield outside the fence.

assortment of poultry, all of minor importance in production.

The only cultivation is of subsistence crops in the small fields and gardens at headquarters to supply the major-domo and his cowboys and their families (all Brazilians of various shades, not recent immigrants). The crops include several acres of corn as the main item, small patches of cassava, sugar cane, and vegetables, and a clump of fruit trees—oranges, pears, and mangoes. Some of these receive a little water from the well in

(Fig. 424) but not enough to give the fazenda a place in the production of timber, as is the case with other tracts of land east and west where the cutting of pine reaches sufficient proportions to make Ponta Grossa one of the lumber milling centers of Brazil.

The fazenda groves contain also a few yerba mate trees; but these also are insignificant in number, and it is necessary to go to another establishment in the vicinity for a sample of this resource.

#### b. CLOCK, A YERBA MATE<sup>1</sup> GROVE

Herval Clock is in the same rolling plateau a few miles west of Ponta

Grossa [Fig. 402(4)]. The owner is a German settler who lives and works

<sup>1</sup> Yerba mate in Spanish, *herva matte* in Portuguese, sometimes called "Paraguay tea" in English.

on the place but who also goes to town to work at odd jobs. The area is 20 acres, in a strip extending from a ridge road down to the adjacent ravine and including a grove of trees on both sides of the valley stream (Fig. 427).

The grove occupies 12 acres and is like those at Fazenda do Arenão in general appearance, containing a few

be a wild crop in the woods of Paraná is probably due to the fact that a sufficient supply has been available from this source. Farther west in the state there are large woodland areas with many more yerba trees per acre than in the grove of Herval Clock. The practicability and efficiency of plantation production in the open are demonstrated by a stand of 1,000 trees

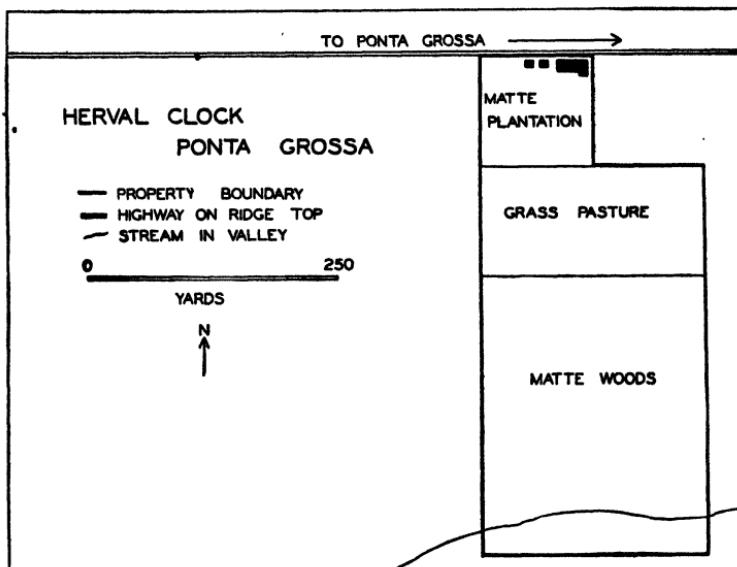


FIG. 427.—A small yerba mate grove in the southern uplands.

Paraná pines as the tallest members and below these a mixed growth of broad-leaved evergreens in which *imbuye*, a good hardwood timber tree, is in evidence and in which the still smaller yerba trees are the most significant.

There are about four hundred yerbas scattered through the grove. They are wild specimens, and the only cultivation is an occasional chopping out of adjacent bushes and small trees to give them more light for the production of their crop of leaves.

That yerba mate has continued to

at Herval Clock in an area of  $2\frac{1}{2}$  acres on the ridge, close to the road (Fig. 428). This 8-year-old plantation is about to produce its first crop, from as many trees in 1 acre as in the 12 acres of the natural grove in the ravine.

The yerba tree yields its product once every three or four years. Every year the leafy boughs are cut from a third or a fourth of the trees, only enough foliage being left for each tree to survive. Still on the boughs, the leaves are dried with fire under carefully arranged conditions, then removed, bagged, and taken to a mill in

Ponta Grossa (Fig. 429), to be cleaned, sorted, and finally prepared for market.

In the past the state of Paraná has been the greatest area of production

being closed to foreign producers by a high tariff, the Brazilian mate region is facing a crisis. Perhaps wild Brazilian mate will have the same fate as wild

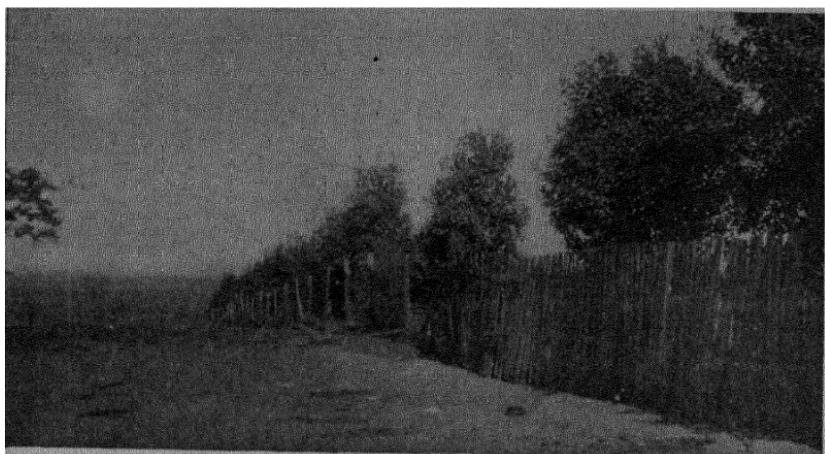


FIG. 428.—Yerba mate plantation on top of the ridge, Herval Clock. View looking south to upland savannas and valley woodlands in the distance.



FIG. 429.—Bags of mate arriving by oxcart and truck at a mate milling plant, Ponta Grossa.

in the world and Argentina the greatest market. Now that plantation production has begun in the Argentine province of Misiones, next door to Paraná, and the Argentine market is

Brazilian rubber. Or perhaps Brazilian mate producers will have the same success as Brazilian coffee producers in developing a great northern market more valuable than Argentina.

### 5. ILHÉOS<sup>1</sup> IN THE TROPICAL EAST COAST REGION

#### a. MUNEZES, A SMALL CACAO FAZENDA

Fazenda Munezes is a small farm about forty miles inland from the port of Ilhéos, state of Bahia [Fig. 402(5)]. The fazenda is among rolling hills of the Brazilian highland, mantled with deep residual soil on old crystalline rocks. Hills and ridges extend for miles in every direction and to the coast itself without intervention of any

The fazenda is a 30-acre strip of land, extending across a small valley between ridges (Fig. 431). The bottom of the valley is about three hundred feet above sea level, and the highest ridge point is about four hundred feet. A small brook flows through the valley. Along the brook is a bit of flood plain; bordering this is a broader area of

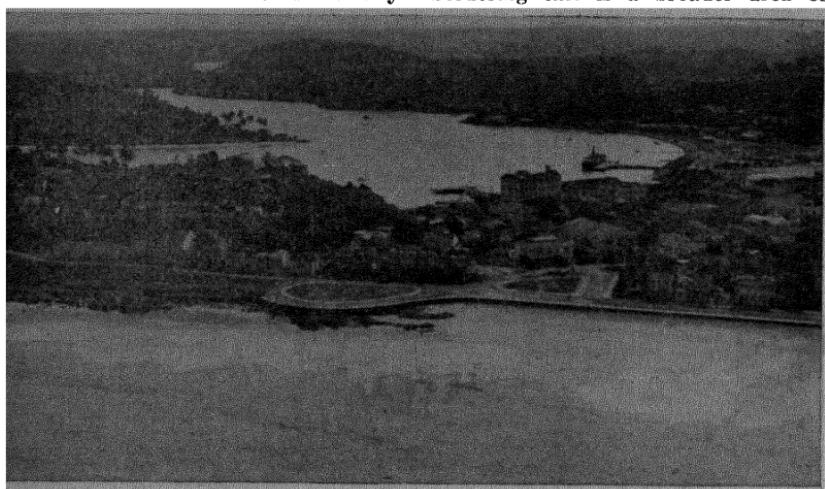


FIG. 430.—Port of Ilhéos, Bahia, chief outlet for cacao plantations. Rocks and hills of the Brazilian highlands extending to the water's edge. Open seashore in the foreground; drowned river harbor accessible for small boats through river mouth (beyond left side of picture). Air view looking west.

coastal plain. Old rocks are exposed on shore where waves wash the foot of hills sheltering Ilhéos harbor (Fig. 430).

Much of the hill country is covered with equatorial rain forest, in accordance with the chronically rainy climate of the area, hot and moist in every season. Some of the forest is a virgin growth of tall trees; more of it is a dense second growth of small trees and bushes. Near the coast, farm clearings are few. At a greater distance inland, they are more numerous, and here the Fazenda Munezes is one among many.

undulating lowland; beyond on both sides are the steep slopes of the ridges.

A remnant of rain forest occupies the crests of the ridges at the ends of the property; a farm clearing occupies the central lowland. But the essential portion is neither valley lowland nor ridge top but the intervening steep slopes, occupied by groves of cacao. Here in an area of about twenty acres of slope there are 6,000 cacao trees yielding four or five tons of cacao per year.

<sup>1</sup> Field work in October, 1935.

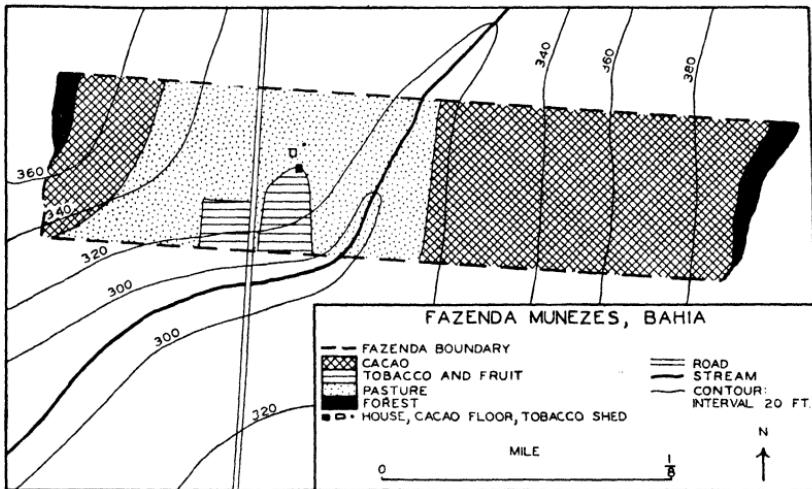


FIG. 431.—Land use in a small cacao plantation.



FIG. 432.—Slope newly cleared for cacao, Ilhéos District, Bahia and shelter crop of cassava, planted after felling and burning, sprouting but hardly visible in the picture. Selva in the background.

The plantation is about twenty years old, dating from the time when settlement of the district for cacao production was active and many such plantations were being established. Here and there in the district the planting of cacao still continues in a small way (Fig. 432). Uniformity prevails in the characteristics of sites chosen and in methods of planting. Generally, areas selected for cacao have deep, well-drained, heavy black or brown residual soil overlying granite; areas of sandy soil or of heavier soil over sedimentary rock or basalt are avoided. Empirical wisdom on the subject is embodied in a local saying that if people do not get their feet muddy and do not see stones on the ground (circumstances related to heavy soil over granite) they will not find good plantation land. Plantations regularly occupy slopes, even slopes as steep as 30 degrees, whereas hilltops and valley bottoms are avoided. According to local opinion, valley bottoms are unfavorable on account of inadequate drainage (except in areas of sand, which likewise are unsuitable), and hilltops are unfavorable on account of excessive desiccation through exposure to wind and low ground-water level.

The common method of planting is to fell the forest cover, trees and undergrowth, to leave the slash on the ground during a few weeks of dry weather, then to burn it over and after a week of cooling to plant the seeds of cacao and cassava (Fig. 432). The cassava springing up affords shade for the cacao seedlings and an interim crop of some value. In a few cases, corn instead of cassava is used as temporary shade. For permanent shade, other trees are planted, and in some cases a few scattered forest trees are left standing for this purpose. Cacao begins to bear after four or five years and reaches its maximum after ten years.

The 20-year-old plantation of Muñezes is almost like the forest in ex-

ternal appearance. Internally, it is like a mature, dense apple orchard. The grove is, in fact, a horticultural establishment. Harvesting is in progress from June to February, a season so long that labor requirements are not concentrated. During the remaining months of the year, from February to May, the problems of pruning, cutting weeds, and combating insect pests engage attention.

The lowland clearing of the fazenda contains a central focus of activity. On a knoll overlooking the brook is the dwelling house of the owner and his family, and near it a fermenting tank and drying floor for cacao (Fig. 433).

The harvesting of cacao is characterized by a need for certain processes to prepare the product for transportation to market. The pods picked from the trees are composed largely of waste pulp from which the cacao beans are to be extracted. Therefore, to avoid transportation of waste matter, the pods are collected in piles at convenient places in the grove and there cut open to remove the beans and discard empty pods. The wet beans are then carried in sacks to the fazenda center, where the processes of fermenting in the tank and drying on the floor change the wet mass of rapidly deteriorating beans into a relatively imperishable standardized transportable product. The drying floor is a well-built structure with a movable roof to cover the floor during rain (Fig. 433).

The clearing contains pasture land and a patch of planted fodder, for the work mule and household livestock of the fazenda, and also two patches of crops. One of these contains a secondary commercial crop, tobacco, to be dried in a small shed near the house and sold in the market. Pineapples for home supply are interplanted with tobacco. The soil is somewhat sandy, lighter than in the cacao groves of the ridge slopes. The other patch of cultivation contains a mixed growth of

mango trees, banana plants, and coffee bushes, all producing for home supply and not for commercial purposes.

The owner of the fazenda and his wife are of Negro blood and came from farther north, near São Salvador, to settle here. The clearings were made and the cacao planted at that time, when the district was being developed and

many other people were planting cacao in the same way. In recent years, many of the small fazendas have been bought up and consolidated into large properties. The Fazenda Munezes is one of the few small plantations still remaining independent and productive in the hands of its original owner.

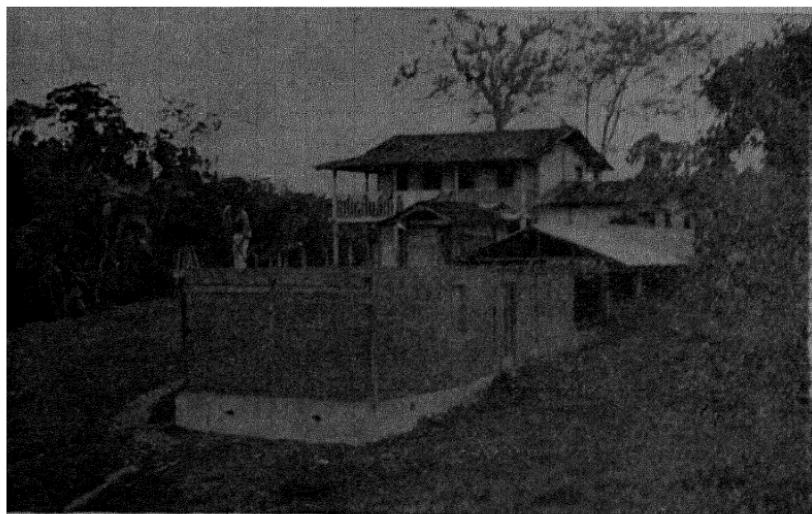


FIG. 433.—House and drying floor, Fazenda Munezes. Farmer spreading cacao on floor uncovered after rain. Movable roof, to cover drying floor, in right center. Cacao plantation under mixed shade on slope at left. View looking southeast.

#### *b. BOA SENTENÇA*

##### A LARGE CACAO FAZENDA

Fazenda Boa Sentença is a few miles from Fazenda Munezes in the same hill country of rain forest and cacao inland from the port of Ilhéos [Fig. 402(5)]. The property is a consolidation of 15 small plantations with a total area of 1,420 acres, occupying a section of stream valley and adjacent hills and ridges in one drainage basin and a small tract across the divide in an adjacent basin (Fig. 434).

Cacao groves occupy 1,100 acres, 77 per cent of the fazenda, all on the slopes of bordering ridges, nearly

encompassing the periphery of the property. Forest occupies 120 acres, 8 per cent of the fazenda, on the crests of ridges. Grass pasture occupies 200 acres, 14 per cent of the fazenda, in the central-valley lowland.

The huts of 100 laborers are scattered over the property at old farmstead sites. Centrally located in the midst of the grassy clearing is the functional focus of the establishment: the owner's dwelling, the manager's dwelling, a schoolhouse, a drying floor, and a cacao storage house. An

old drying floor has recently been replaced by a new one, with provision for kiln drying when the weather is not right for sun drying (Fig. 435).

Cacao is harvested as at Munezes from June to February, the pods opened at convenient places in the

the crop Boa Sentença has the advantage of larger quantity, 240 tons per year, and of direct connections with an exporting firm.

The owner of the fazenda is one of the great cacao merchants of Baía. He has agencies and warehouses at the

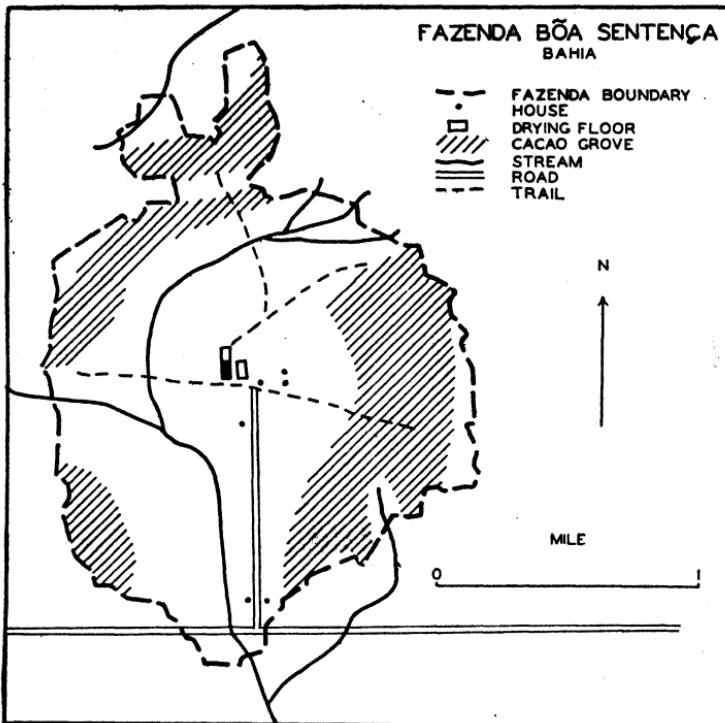


FIG. 434.—Land use in a large cacao plantation. Most of the unshaded area in the valley is occupied by grass pasture, that on ridge tops by forest.

groves, and the beans carried in baskets on burros to the central drying establishment (Fig. 436). Thereafter the product is transported to the market town of Itabuna, thence by truck or rail to the port of Ilhéos, and thence by ship to world markets.

The production of the crop, its handling in the groves, and even its preparation at the drying establishment differ very little from the corresponding activities at the small fazenda of Munezes. But in marketing

interior market towns, the coastal ports, and the city of São Salvador and owns other fazendas in addition to Boa Sentença. He belongs to a Swiss family and lives in São Salvador. Other exporting firms likewise have bought up small fazendas to form large ones and control part of their source of supply. Thus, large-scale production integrated with trade and transportation has become characteristic of the cacao region of Baía.

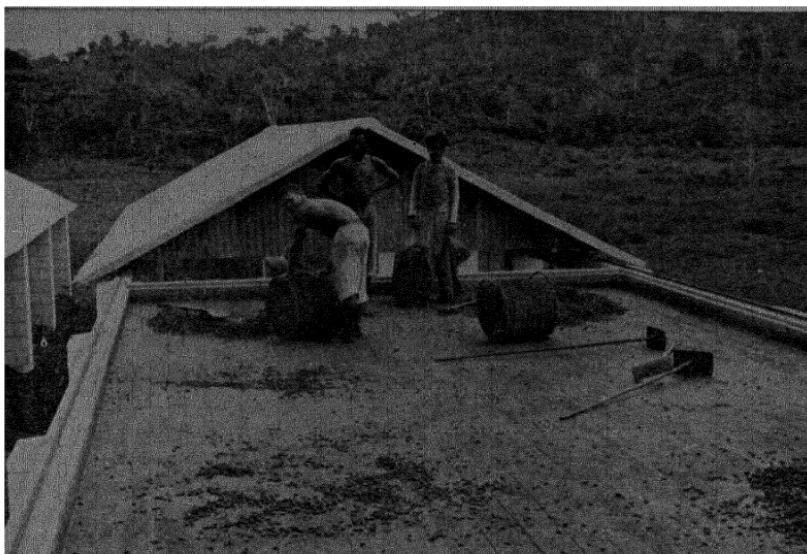


FIG. 435.—Cacao beans, extracted from pods at collecting points in plantations, brought to drying floor at headquarters, Fazenda Boa Sentença. Movable roof of drying floor just behind laborers. Cacao plantations on slopes in the background.



FIG. 436.—Pack train of cacao beans from plantation slopes to central drying floor, Boa Sentença. Grassland in valley bottom, cacao plantations on slopes.

## 6. São João<sup>1</sup>

### A COTTON PLANTATION IN THE DRY NORTHEAST

Sitio São João is in the state of Ceará, about one hundred miles inland from the coast, south of the port of Fortaleza [Fig. 402(6)]. The district is a distinctive area of the Brazilian highlands. Rounded granite domes and pinnacles 1,000 feet high are scattered conspicuously over an undulating upland. The granite monadnocks are

December, irregularly moist from January to March, with an average annual rainfall of 25 inches.

After a rainy period, many watercourses carry streams temporarily. Some valleys, few and far between, contain permanent streams rising in one of the groups of mountains. One such valley is that of Quixadá, in

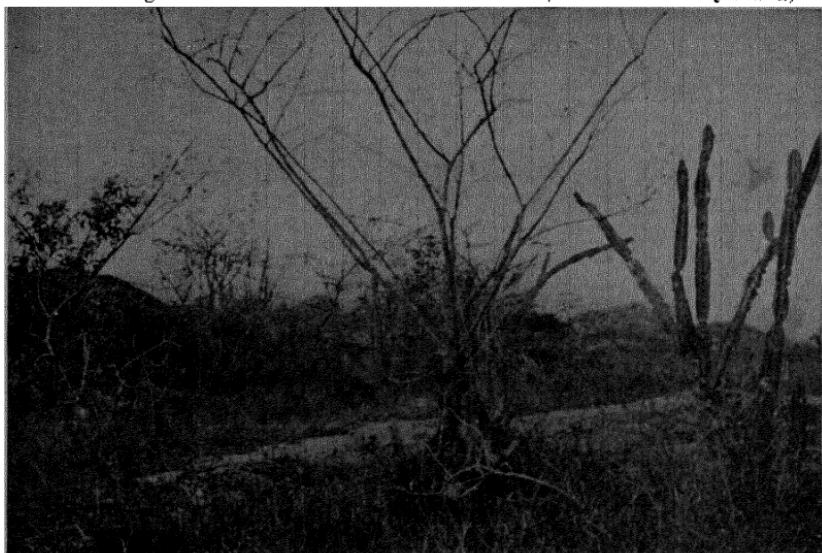


FIG. 437.—Dry bush vegetation (*caatinga*) of the *sertão*, upland near Quixadá.

of smooth bare rock, devoid of soil or vegetation. The worn-down upland surface is mantled with residual soils, mostly light in texture; it has the characteristic caatinga vegetation of the dry *sertão*: scattered xerophytic shrubs and cacti, scanty herbaceous plants and bare ground, green after the rain of a short and uncertain rainy season, brown and dry through the rest of the year (Fig. 437). The climate is semiarid low latitude, hot in every season, regularly dry from April to

which is the Sitio São João. The headwaters of this river system join together and emerge from an area of low mountains by way of a narrow valley between granite ridges (Fig. 438). At this convenient narrow place a dam has been built, forming a reservoir lake to impound the runoff from a headwater area of 100 square miles and make it available for irrigation in the valley below over an irrigable area of 40 square miles (Fig. 439). From the dam, two primary canals extend

<sup>1</sup> Field work in September, 1935.

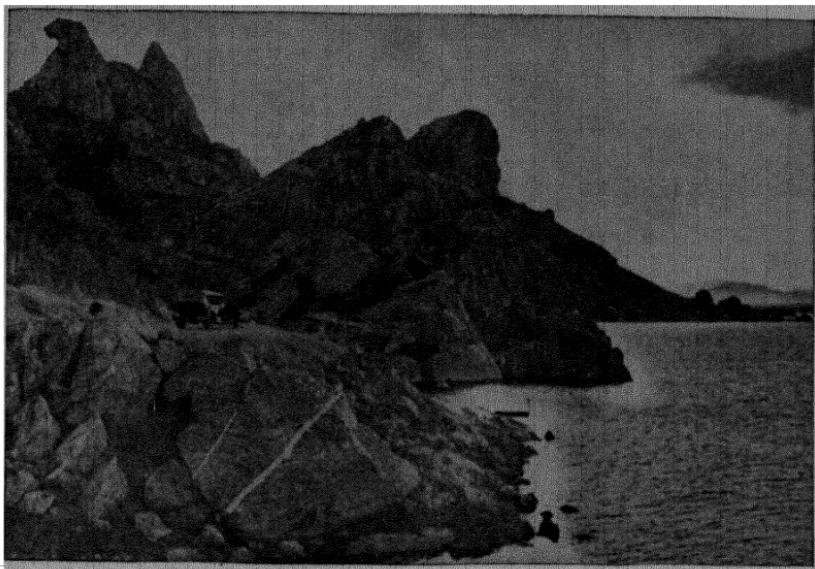


FIG. 438.—Storage reservoir for irrigation in Quixadá Valley, among crystalline rock hills of the Brazilian highlands.

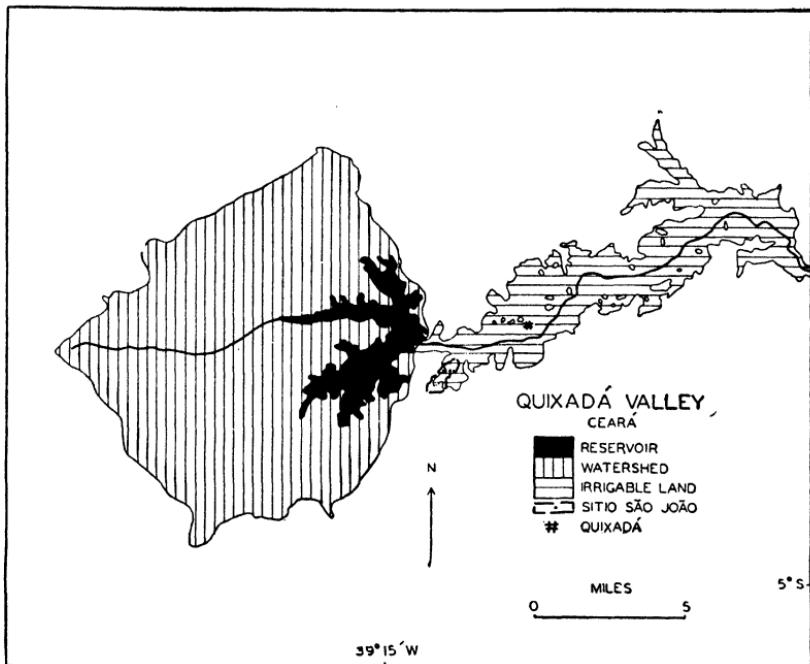


FIG. 439.—Watershed and irrigable valley of Quixadá.

down the valley, one on either side (Fig. 440).

Sitio São João is 2 miles below the dam on the southern margin of the valley (Fig. 441). Of the 300 acres in the property, about 100 acres are in bare granite hills and sandy caatinga land above the valley floor. The remaining 200 acres are alluvial land

Cotton is the major crop of the plantation (Fig. 442). It is produced by modern agricultural methods, similar to those used for cotton under irrigation in other countries. From one planting the crop yields well for four or five years. Thereafter, the crop having lost ground in its competition with weeds and yields having declined,

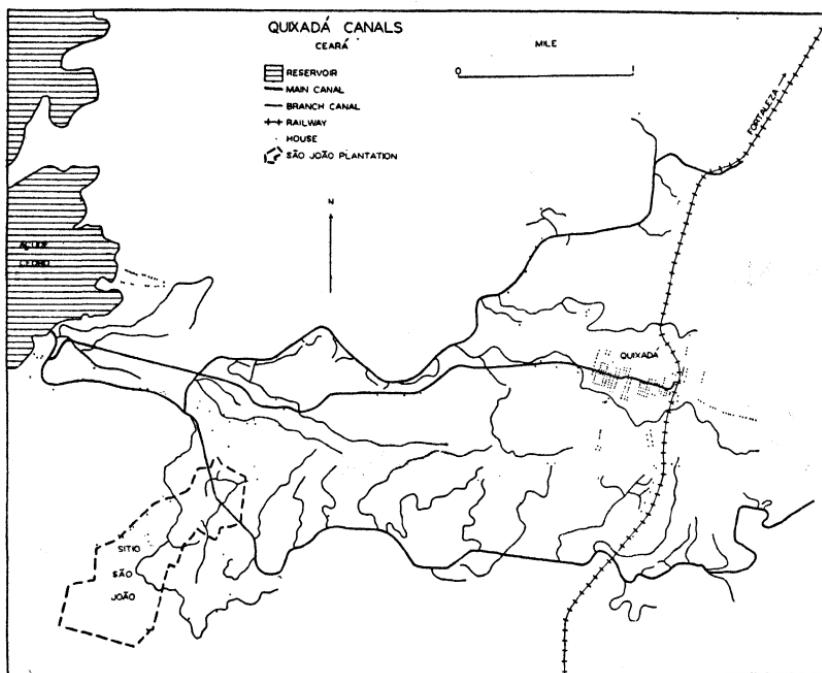


FIG. 440.—Irrigation canals of Quixadá Valley, and site of Sitio São João.

of the valley floor, within reach of water from the reservoir.

One of the primary canals from the reservoir crosses the northern end of the property, and from this a secondary canal branches off to give water to the 200 irrigable acres of the plantation. Much of this land is in the lower course of an intermittent stream tributary to the main river. The irrigation canal carries water up this tributary valley as far as the gradient will allow (Fig. 441).

the field is plowed up and planted to alfalfa or left fallow for one or more years before beginning a new series of cotton years.

The cotton crop is carried in bags to the central headquarters of the plantation for temporary storage in an old warehouse, whence it is taken by truck to a gin in Quixadá.

The group of headquarters buildings is on a hill near the center of the property and includes the dwelling house of the owner and several houses for

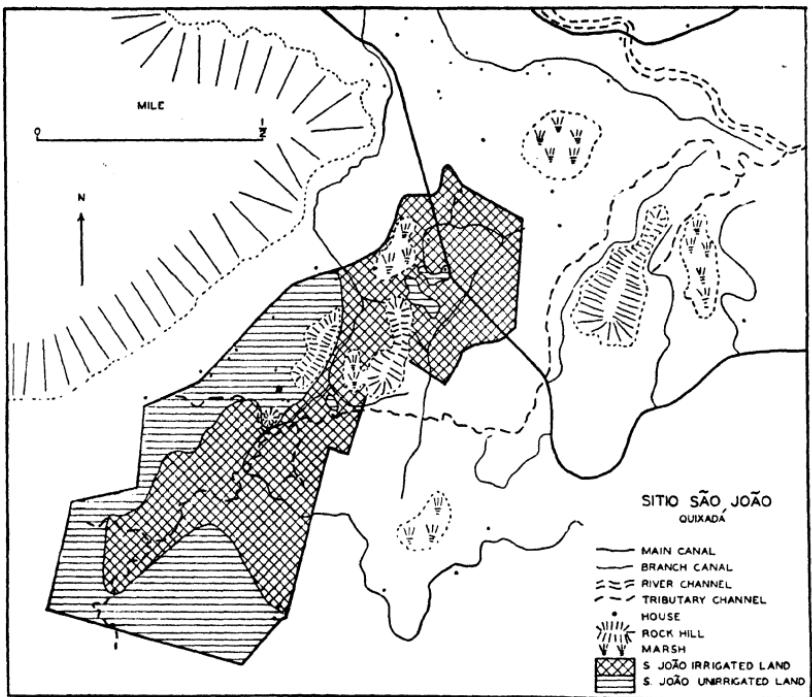


FIG. 441.—Land use in a cotton plantation.



FIG. 442.—Owner of Sítio São João in one of his cotton fields, at harvesttime.

laborers. Near by there are a small permanent pasture, a small field of corn, and a garden patch of other supply crops.

The owner of the plantation is a Brazilian of Portuguese ancestry whose family has owned property in Ceará for generations and has been influential in domestic affairs (Fig. 442).

Recent prosperity came with the curtailment of North American cotton production and the world demand for

Brazilian cotton. Several gins in Quixadá have been kept busy ginning and baling the cotton that has poured in from near-by plantations; trainloads of cotton have moved constantly from Quixadá to the port of Fortaleza; warehouses in Fortaleza have been active day and night (Fig. 443); and foreign ships have crowded the harbor, taking on cargo and departing for overseas.

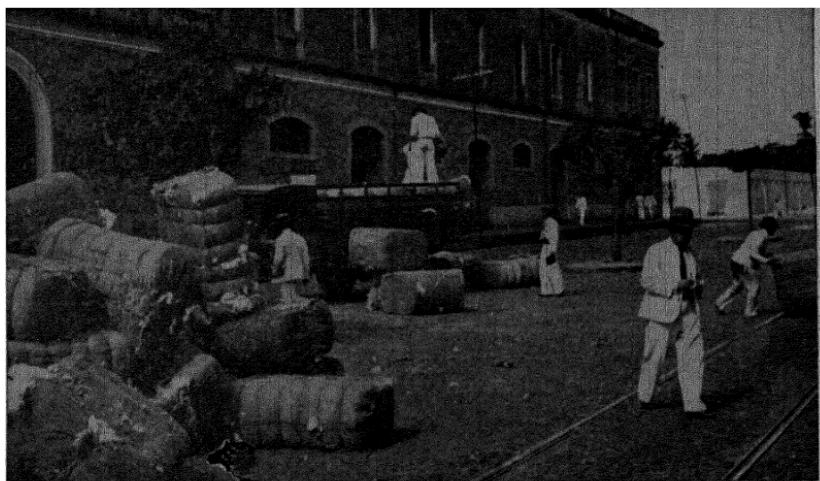


FIG. 443.—Bales of cotton for export, straining the facilities of storage and transport at the port of Fortaleza, Ceará.

## 7. CEARÁ COAST<sup>1</sup> IN THE DRY NORTHEAST

### a. CARNAUBA GROVE

The coast of Ceará is a low plain [Fig. 402(7)]. Mountains appear only in isolated blocks in the dim distance. The shore is fringed by sand beaches and a belt of dunes. Behind the dunes where streams are blocked on their way to the sea, lagoons and marshes are numerous (Fig. 444).

The vegetation of this coastal region is not luxuriant. The climate is of a low-latitude semiarid type, marked by a long dry season and a short rainy

season and heat in every season. Xerophytic bush vegetation is characteristic, fairly dense over much of the plain, interrupted in dunes and marshes. The most conspicuous growth of trees is around the margins of marshes and lagoons. This growth is largely of one kind of tree—carnauba palms, in open groves.

The Balança grove is a property of about 100 acres 3 miles south of Fortaleza (Fig. 445). A small stream

<sup>1</sup> Field work in September, 1935.

ponded behind the near-by dune barrier follows a sluggish course through

lake. The growth is a natural one and the trees have not been cared for, but



FIG. 444.—Air view southward, looking inland from over the seashore. Sand dunes in the foreground; lake formed by a stream ponded behind the dunes; mountain ranges (*serras*) of Ceará in the distance. Carnauba palm groves on marshy shores of the lake.

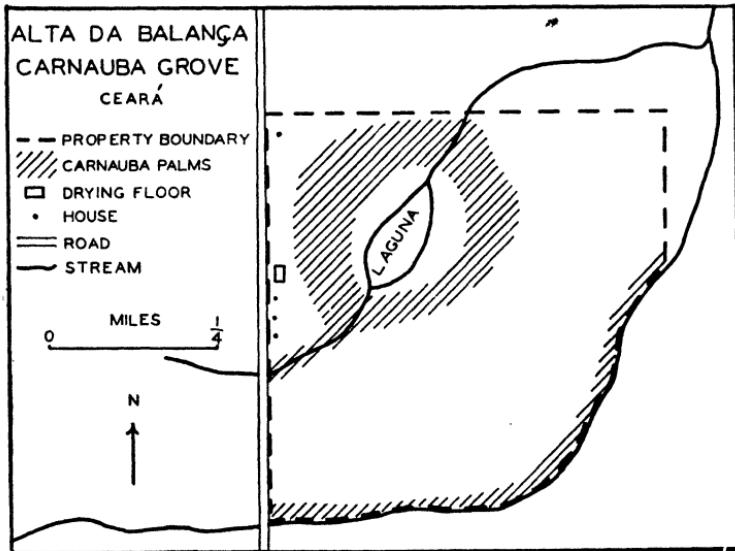


FIG. 445.—A carnauba palm grove property.

the property and forms a lake in the central part of it. Carnauba palms grow along the stream and around the

recently seedlings have been tended and transplanted to perpetuate and enlarge the grove.

The central focus of activities is on the west side of the property near a road that leads to Fortaleza. Here a smooth well-drained acre of land has been cleared of vegetation and is used as a drying floor (Fig. 446). During the dry season a portion of the mature leaves of the carnauba are cut off, brought to the drying floor, and spread in the sun. After some days of drying they are bundled up and taken to a closed hut at one side of the floor. Here they are beaten violently, the desired carnauba wax being thus removed in fine flakes from the leaf

surfaces. A coating of wax accumulates in the hut to be swept up, packaged, trucked to Fortaleza, and shipped to the United States. Its chief use is in floor wax, for which it has the advantages of no odor and high melting point.

The owner of the property lives in a house near the drying floor and supervises the work of his six laborers. He is of white blood, possibly Dutch as are many people of Ceará. The laborers, also, are white inhabitants of the district.



FIG. 446.—Carnauba palm leaves in bundles and spread to dry, before removal of wax coating, Balançá grove, Ceará. Workers under shelter at right; young carnauba palms in the foreground; mature trees in the background. View looking east toward lagoon.

#### b. JANGADA FISHING

In the Dry Northeast, occupancy is concentrated along the coast. This area of concentration is viewed in a traverse by air from the eastern extremity of the coast to the mouth of the Amazon. At Ponta Timbáhú, the easternmost point of America, there are reefs of sandstone and coral at the water's edge, bluffs of red clay, and

an undulating upland covered with bushy woods extending inland. At Natal, the northeasternmost port, the shore line is broken by the broad estuary of a stream, forming a good harbor.

**NORTH COAST.** The traverse proceeds northwestward following reefs, bluffs, and beaches. In many places,

dune forms dominate the landscape alongshore—crescentic barchan dunes where a limited quantity of sand is driven inland over smooth land.

Signs of human occupancy are included in the pattern—at a few points, salt pans on tidal flats; at many points, farming of the sorts to be expected on a tropic coast (Fig. 447).

Fishing also makes a place for itself in the pattern of occupancy. Fish traps are numerous, in shallow water

type drawn up on the open beach—*jangadas*, sailing rafts designed to fit the circumstances of the region. These may be observed at close range at a fishing port near Fortaleza, on the coast of Ceará, 400 miles from the starting point of the traverse.

Regional circumstances to which this unit of occupancy is well-adapted include the following:

First, a good market for fish, a land area where a considerable population

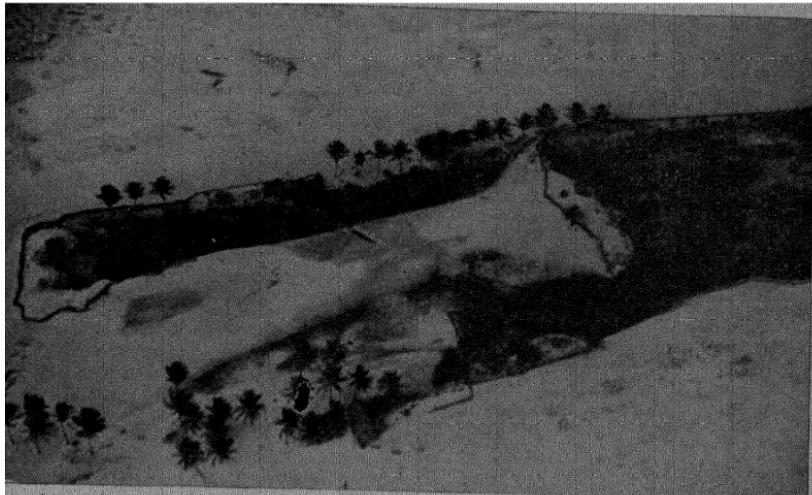


FIG. 447.—A patch of farm land among dunes, coast of Ceará. Coconut palms and supply crops. Air view.

**alongshore.** The most common are like the pound nets of middle latitudes, designed to solve the same problems in a similar way, so that even the same names used by North American fishermen would serve to describe their parts “leader” to refer to the shoreward extension deflecting fish in their movements along shore; “heart” to refer to the outer wings of the trap; and “pound” to refer to the impounding center. These are for certain fish close to shore, but there are many other fish to be caught and other means of catching them.

**FISHING PORT.** At villages along the coast are fishing craft of a special

is pressing on the means of subsistence, where agricultural food production is limited by semiaridity and occasionally curtailed by drought.

Second, a sandy shore without protection against heavy surf regularly breaking on it, a difficult place to handle boats which could be swamped, but not difficult for rafts, which defy waves and can be drawn up on the beach (Fig. 448). Dry clothing is unnecessary when air and water temperatures are always high, averaging nearly 80°F. in every season.

Third, fresh easterly winds, blowing offshore at dawn and strongly onshore after noon, available regularly to



FIG. 448.—A *jangada* landing in surf on the beach, east of Fortaleza.

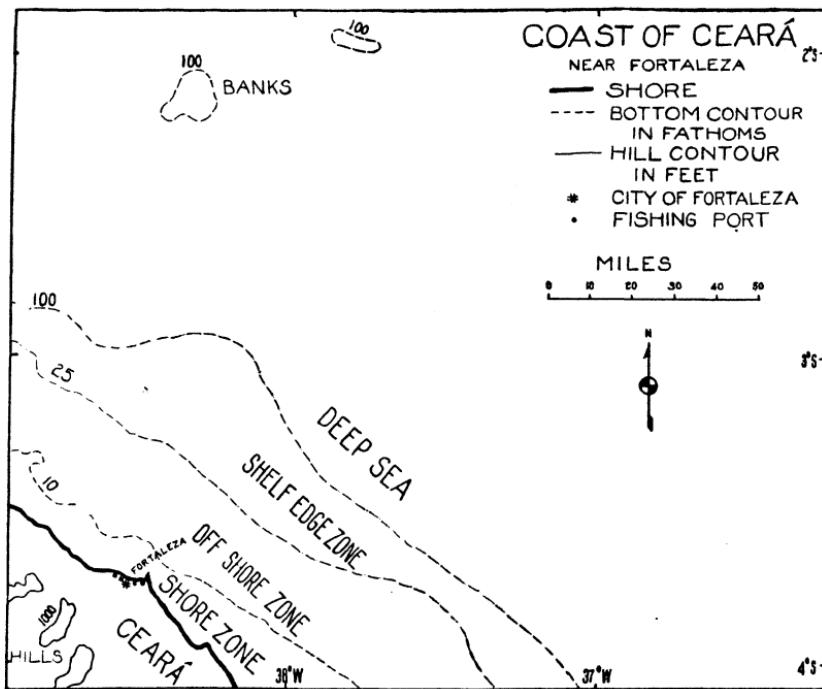


FIG. 449.—Fishing grounds and villages near Fortaleza.

propulsion of sailing craft designed to beat against the wind as well as run before it, as are these rafts rigged with spritsail and centerboard.

Finally, good fishing grounds offshore at a distance of 10 miles; better fishing grounds still farther out, on the edge of the continental shelf to a distance of 60 miles; and banks at a distance of 100 miles, accessible to

teristic of areas on the edge of the continental shelf.

The distant banks are not often used, but occasionally some fishermen visit them, sailing out on one day, fishing on the second, and returning on the third, navigating by stars or sun, snatching a little sleep during nights at sea in spite of a lack of sleeping quarters. Fishermen tell tales



FIG. 450.—*Jangada* fleet arriving from the fishing grounds, bringing their catch for an afternoon fish market on the beach, east of Fortaleza.

fishermen carried by the trade wind (Fig. 449).

In contrast to the floating fish of the shore zone, the fish of the farther grounds are bottom fish, of types common to similar sites in tropical waters from Brazil to Bermuda. Some of these, not the best or the most plentiful (jacks, chub, and mullets) are caught on light sandy bottom characteristic of most of the offshore zone. Others, more valuable and plentiful (grouper and snappers) are caught on dark rocky bottom, charac-

of having been met far out at sea by ocean liners which tried to rescue them, on the theory that their boat was sinking.

The rafts are made of buoyant logs, brought from the Amazon, known by the general name of "balsa," meaning "raft" wood. A rack near the stern provides a secure place for a basket of fish and a support for the crew to hold fast. The crew consists of four men. The usual routine is a start soon after dawn, a 2 hours' run to fishing grounds located by sighting familiar

peaks of the inland ranges, several hours of fishing with hook and line at depths of 25 fathoms or more, taking in three or four hundred pounds of fish, and a run back to land before the stronger sea breeze of the afternoon to arrive before dusk and sell the catch at a market of consumers and peddlers on the beach (Fig. 450).

Twenty *jangadas* sail from this port, and the total production is about sixty

fry caught in cast nets, to be used for bait.

Farther inland fishing is known mainly as a minor potentiality of irrigation reservoirs among barren hills of the *sertão*. Here fish culture has a place in the program of national planning.

WESTWARD. The traverse continues westward 800 miles along the coast to the mouth of the Amazon, from



FIG. 451. Selva in Pará, near the coast east of the Amazon. Air view.

tons of fish per month, all sold fresh and consumed locally. This amount represents a low productivity per fisherman, consistent with the circumstances of deep fishing at distant places with a minimum of equipment, yet considered satisfactory in a region of overpopulation and simple requirements for living.

From the beach the domain of fishing extends landward as well as seaward, to include the zone of ponded streams on the inland side of the dunes (Fig. 444). These are of interest to *jangada* fishermen as a source of small

crystalline hill country of the Brazilian highland to plains of unindurated sedimentaries mantled with friable soils and striped with recent alluvium (Fig. 3, page 11); from a semiarid to a chronically rainy climate (Fig. 4, page 12); from caatinga and agreste, xerophytic bushlands and grazing lands marked by paths of goats and cattle in Ceará, to equatorial rain forest, selva, *matto alto* in Pará (Fig. 5, page 13), rich and varied in detail, markedly uniform in general aspect over large areas. The forest near the mouth of the Amazon, as seen from the air, can

hardly be distinguished from that hundreds or even thousands of miles up the river (Fig. 451).

Such apparent uniformity may be deceptive. From place to place in the Amazon region, there is variety both of natural environment and of human occupancy. People make their marks on the landscape, in small clearings and large, some temporary and others permanent, some on flood plains and

others on uplands. In some places, forest gives way to grassland occupied by cattle ranches, localized particularly along the lower course of the Amazon, between the estuaries in the district sometimes referred to as "the delta." These and other forms of occupancy deserve closer observation before generalizations are made on the actualities and potentialities of the region.

### 8. MARAJÓ ISLAND<sup>1</sup>

#### CATTLE RANCHES AT THE AMAZON MOUTH

At the mouth of the Amazon there is no delta protruding into the sea [Fig. 402(8)]. There are, on the con-

tinues on up the main river and tributaries for a distance of more than four hundred miles. The river

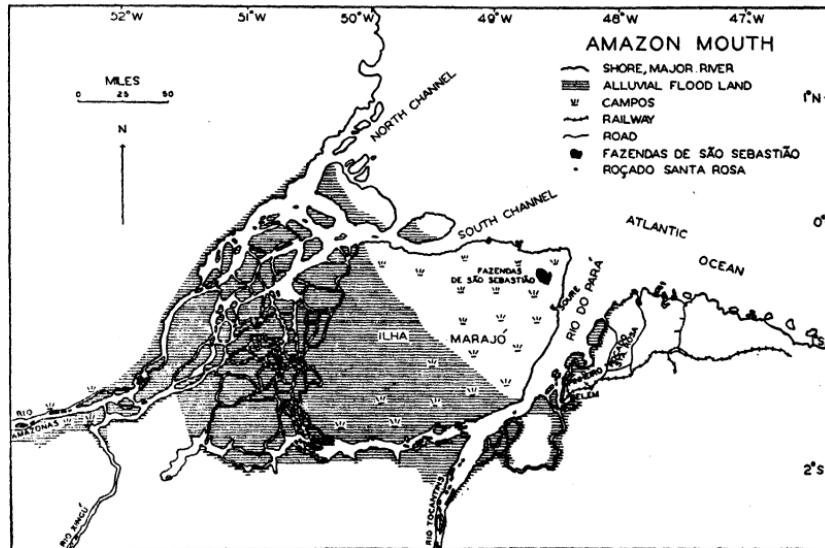


FIG. 452.—Land types at the mouth of the Amazon. Study site on Marajó Island. Most of the land not classified as "alluvial flood" is upland plain, and most of the land that is not grassy (campos) is forested. (Based on P. de Toledo, "Mata e Campos no Brasil," Serviço Geológico e Mineralógico, 1911; and C. F. Marbut and C. B. Manifold, *The Topography of the Amazon Valley*, *Geographical Review*, Vol. 15 (1925).)

trary, tidal estuaries protruding into the land. The tide not only enters a maze of channels near the sea but

carries an enormous load of sediment toward the sea, and a great area of alluvial land appears where valleys

<sup>1</sup> Field work in October, 1935.

widen and coalesce in estuaries near the coast. However, the name "delta" is a doubtful designation for this land. At least a part of it has the aspect of old submerged land rather than of recent deposition; part if not all has

indicate that it is not valley land. Its surface is a plain very little above the level of the sea. Numerous stream channels that rise in the island interior and meander to the coast are estuaries filled to the brim by a rising tide.

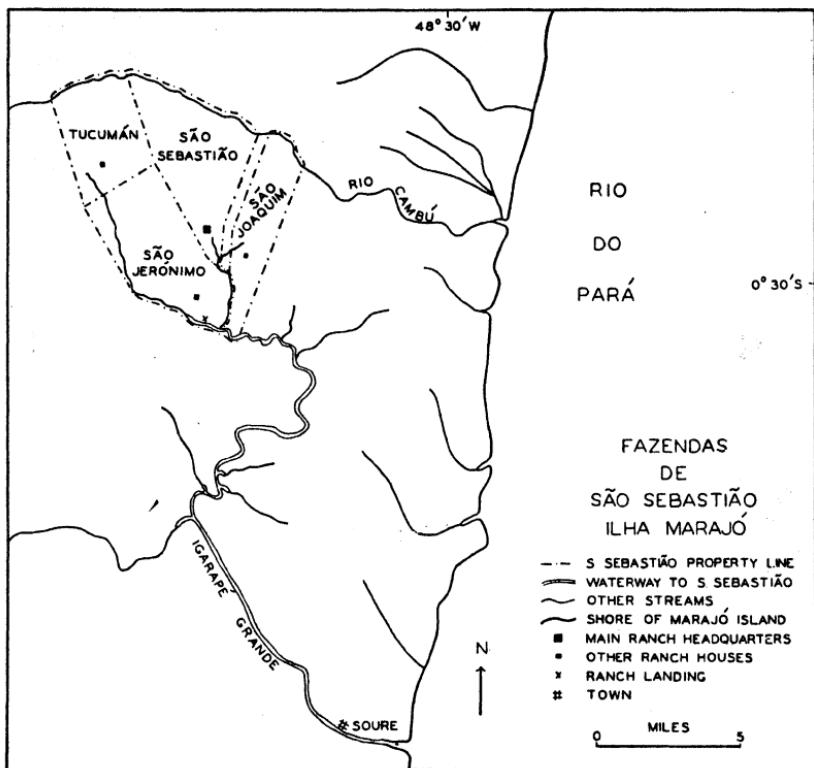


FIG. 453.—A cattle ranch on Marajó Island.

flood plain rather than delta location. The alluvial land is almost separated from the sea by older land strung across the river mouth in islands and mainland (Fig. 452).

A conspicuous block of such land, of Tertiary sedimentaries mantled with clay and silt, forms the seaward side of Marajó Island, an undulating upland of 10,000 square miles between estuaries. The term "upland" is hardly an appropriate word for it, except to

Apparently the island is not flooded by water from the sea or from the Amazon; but in the rainy season its nearly flat surface is practically covered with water, while precipitation exceeds runoff. There is marked seasonal differentiation: 6 months of rain are followed by 6 months of drought more pronounced than on the near-by mainland across the Rio do Pará. Seasonal changes in temperature are very slight, the average temperature for every

month being close to 80°F. The equator traverses the mouth of the Amazon close by.

On the island, equatorial forest gives way to extensive campos (open grasslands). Probably this fact is to be correlated with the extreme alternation of saturation and desiccation. Forests fringe the shores of the island and the banks of the inland waterways, where moisture is always present; and clumps of forest crown knolls where

Each of the constituent fazendas has a waterway frontage. Presumably the old property division was designed to fit this specification. The waterways have retained their significance as the only mode of access, although now at São Sebastião only one landing place is used for all four of the constituent fazendas.

The consolidated property is bounded by watercourses on the north and on the south and extends across the divide

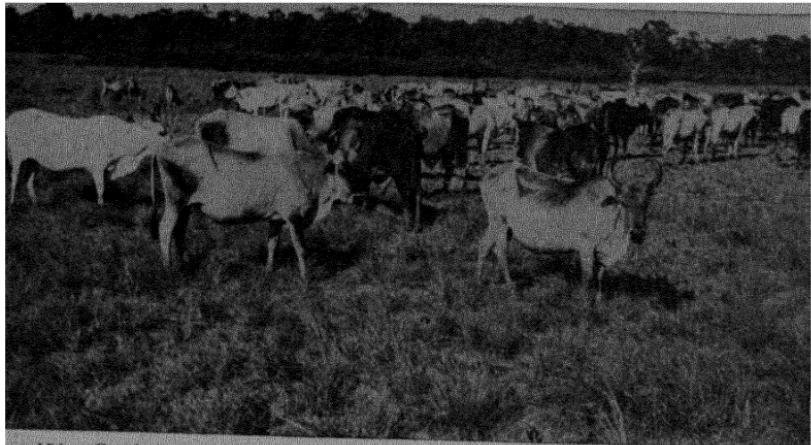


FIG. 454. Cattle in savanna pasture, Fazenda São Sebastião, Maranhão Island. Trees in the background on lower land along a river channel. View looking south from a ranch house.

**drainage is always good.** Intermediate land, neither close to waterways nor on divides, is covered with short mixed grasses.

**CATTLE RANCH.** For a century or more, cattle ranches have been the characteristic type of occupancy on these accessible equatorial grazing lands. One such ranch is the Fazenda São Sebastião (Fig. 453). The property, in fact, consists of four old fazendas now combined into one productive unit.

The place is in the northeastern part of the island, 30 miles south of the equator, 10 miles inland as the crow flies from the east shore of the island (Fig. 452), 20 miles inland as traffic moves from the mouth of a sinuous waterway (Fig. 453).

between, a distance of about 7 miles. The total area is about 40 square miles, or 25,000 acres. Fringes of forest extend not only along the main waterways but also along small branches within the property so that views over the plain are bounded by trees (Fig. 454). The trees of the stream fringes are broad-leaved evergreens of types characteristic of tropical swamp lands.

The land rises gradually from stream banks to divide areas. Higher spots on the divide are marked by groves of trees; but the rise from streams to divides is almost imperceptible, and thus, from a distance, upland groves appear very little different from stream fringes. Upon close examination groves are seen to be well drained and sandy,

at least in some cases. The tree growth is a mixture of palms and other broad-leaved evergreens of kinds unlike those along streams. Such places are valuable as the driest spots in the rainy season and as islands of shade in the midst of pastures.

Most of the land, 90 per cent of the total, is neither on divides nor along streams but is in grassy plains between the two. At the height of the rainy season the plains are a dark green morass in which animals sink ankle-deep or even knee-deep; at the height of the dry season they form a light green hoof-scarred, mud-cracked floor. There is no cultivation of any crop. No effort is made to improve the pasture, except by setting dry grass on fire in the latter part of the dry season to make way for new succulent growth. Fires are started at random by the cowboys and burn out at the edge of woods or on bare ground.

The main objective of the establishment is production of beef for the Pará market. The fazenda supports 6,000 cattle, one head to 4 acres. The management of the animals is careful and well organized. Fences and streams bound the property and separate the four constituent fazendas from each other, so that the animals are divided into at least four herds and breeding is controlled.

The cattle are a cross of zebu and criollo stock. Zebu bulls are obtained from the ranges of central Brazil, Minas Geraes, six or eight being brought in every year to avoid inbreeding and to keep up the number. The criollo cows are descendants of animals brought from Europe when the land was settled. The cross produces a large and resistant beef animal. The product is not perfect, leanness and toughness being characteristic of the animal. Therefore, improvement has been sought at a neighboring establishment by crossing the zebu-criollo offspring in the next generation with Swiss cattle. This

seems to improve the quantity and quality of meat without loss of hardness. But it is an exceptional refinement not considered necessary by other successful breeders.

The steers are kept in pasture continuously through rainy and dry seasons until they are four years old. A band of cowboys presides, weekly roundups are held, for examination and care of animals. There are no dipping tanks and no shelters for the cattle.

**HAZARDS.** Major handicaps have to do with the annual excesses of wetness or dryness, with ticks and other insect pests. Minor handicaps are more remarkable. Snakes cause some losses, the greater part of which are due to rattlers. But these depredations are slight, for cattle are not killed by rattlesnakes unless bitten on the nose. Horses succumb when bitten on the leg and therefore account for more casualties.

Alligators are another minor hazard. At times of high water, they come up the waterways of the island and occasionally they seize and kill livestock drinking or standing in shallow water. At São Sebastião, there are no lagoons infested with them as there are on some other fazendas. Some fazenderos have an annual alligator hunt to keep the reptiles in check. At the end of the rainy season when the waters recede, a band of cowboys visits shallow lagoons where alligators are concentrated. There the band is divided. One group armed with lances advances through the water, waist-deep, prodding and driving the alligators out at the opposite end. Another group armed with axes is stationed on the shore to which the animals are being driven to kill them by a blow behind the head as they emerge from the water. A third group armed with lassos is stationed behind the axmen to capture and drag back to them any that may escape the first blows and head for the woods.

Another peculiar minor hazard exists at fazendas farther west than São Sebastião. There in swamp woods are wild buffaloes, which occasionally raid fazenda herds and carry off cows to join their wild herds. These animals are descendants of African buffaloes which were imported to the island many years ago as domestic animals on the grasslands. The experiment was unsuccessful; some of the animals escaped

**BUILDINGS.** The main headquarters group consists of several corrals and five or six dwellings, located in the divide area near the center of the property. A windmill provides domestic water supply; a water hole dug near a clump of trees provides water for the livestock. The houses are of sawn lumber and tile brought from across the Rio do Pará. The residents are the cowboys and their families, natives of



FIG. 455.—Cowboy and wife and horse, Fazenda São Sebastião. Headquarters building in the background.

and maintained themselves in a wild state. They are more ferocious and dangerous in attack than any other animal in the area. *Fazenderos* in the western section have an annual roundup, in which mounted cowboys accompanied by dogs beat the woods and finally shoot the quarry.

There are a few jaguars in the woods of São Sebastião as well as on other fazendas, but these are unimportant either as a menace or as a resource.

As already indicated, these minor hazards are localized and secondary, when compared with the normal handicaps of weather and insects.

Marajó Island, descendants of Negro slaves (brought from Africa when cattle ranches were established) and of Indians (Fig. 455). The best house is a cottage for the owner, a Brazilian businessman who lives and works in the city of Belém and uses the fazenda as a country place for rest and recreation. The head cowboy is the only resident administrator. At the three outlying ranch headquarters, there are corrals and a dwelling house.

The only other building improvement is a corral and cattle runway at the shipping place. The site selected for this purpose is a firm bank, acces-

sible over open ground from the main pasture areas and near a downstream corner of the property on a deep waterway. A tidal range of 10 feet makes it more convenient to load cattle at high tide, but the waterway is large enough for the boats to turn and lie alongside even at low tide.

**MARKET.** The boats are heavy two-masted sailing vessels with auxiliary oil-burning engine; they are 40 feet in length, draw 6 feet, and have a capacity of 47 head of cattle. They belong to a company in Belém. Their function is to take cattle from island fazendas, including São Sebastião, down the waterways of Marajó and across the Rio do Pará to the Belém municipal slaughter house at Pinheiro on the mainland shore north of the city, a voyage of about 12 hours.

The main period of marketing is after the rainy season when pastures are drying up. The city market is fairly constant through the year; it is supplied chiefly from ranches of the flood plain up the river during the rainy season, from Marajó Island in the dry season. Perhaps this reflects complementary conditions: during the dry season, flood-plain grasslands are in satisfactory condition; during the rainy season, they are flooded, and cattle are driven to small clearings on natural levees at the riverbank whence it is convenient and desirable to ship them to market. On the other hand at

Marajó Island, where the higher land is on extensive watersheds instead of on natural levees, cattle retreat from stream banks to find good pasture during the rainy season, whereas in the dry season they are conveniently shipped from drying pastures.

**OTHER LIVESTOCK.** In addition to cattle, the fazenda has a few hundred horses of which some are used by the cowboys and some are sold every year. They are small animals of old criollo stock, hardy, breeding without special attention, and suitable as cowboy mounts (Fig. 455). In a few other fazendas, improvement has been obtained from a cross of criollo stock with Arab and English stallions, but there seems to be little incentive for such efforts, on account of the limited and easily satisfied local market.

A small flock of sheep completes the list of grazing animals at São Sebastião. These are of Italian-African stock, brought in as a minor experiment and used for home supply. They maintain themselves satisfactorily but do not warrant further experimentation. A continuance of beef production for the near-by city market seems to be the destiny of São Sebastião and some two hundred other fazendas occupying the grasslands of Marajó Island, unless war gives this unforested plain at the Amazon mouth a place in intercontinental strategy.

#### 9. SANTA ROSA<sup>1</sup>

##### A FOREST SETTLEMENT AT THE AMAZON MOUTH

On the mainland side of the Rio do Pará is another kind of land [Fig. 402(9)]. Like Marajó Island the area is predominantly an undulating upland plain, though it is slightly higher than Marajó; its interior valleys contain only small streams and are not drowned into tidal estuaries. Apparently, the dry season is less pronounced than on

the island. The natural vegetation of almost all the area is equatorial rain forest. Though near to the chief Amazon port of Belém, this district was naturally more difficult to penetrate and occupy than was Marajó Island; it was not occupied until after the days when great fazendas were freely established. In modern times, it

<sup>1</sup> Field work in October, 1935.

was natural that this area should be chosen for penetration by a railway from the city, later supplemented by ramifying highways (Fig. 456). Consequently, it was natural, also, that the area should be chosen for colonization in efforts to place landless settlers on accessible unappropriated land. This

ment both before and after the establishment of colonies, both within and without the colony lands. An example of one type of settlement is here presented.

**SETTLEMENT.** The farm lots of Colonia Santa Rosa are platted along both sides of a road that branches off

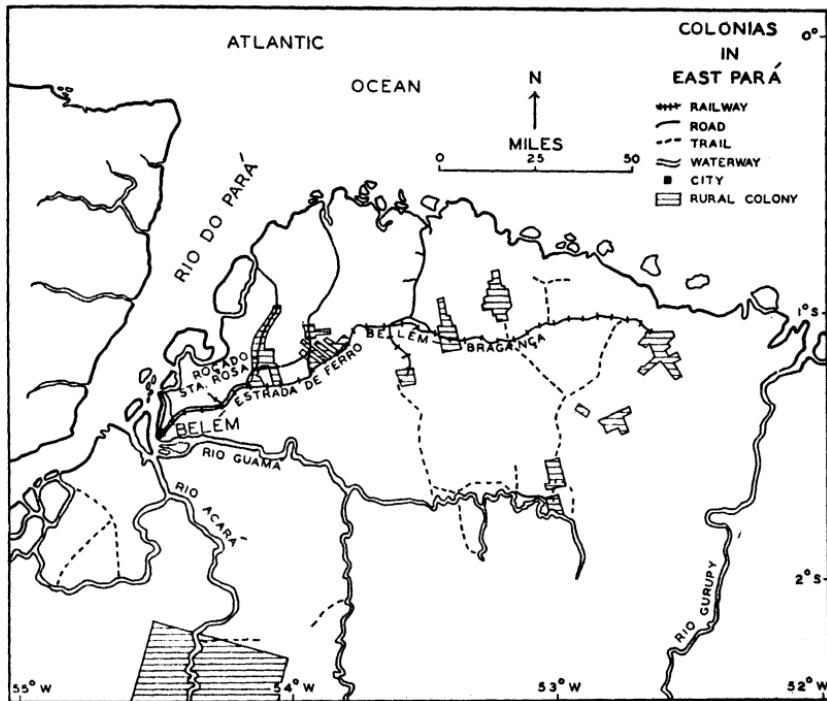


FIG. 456.—Rural settlement projects in eastern Pará.

forested interior upland is still the only area in the state of Pará served by public railway and highway.

A dozen colonies for settlement of the land, some private and some government enterprises, have been planned and laid out, at least on paper. The selection of sites has been in accordance with the supposed availability, accessibility, and desirability of the land. Although very few of the objectives have been realized, there has been a considerable amount of settle-

from the railway and gives access to an upland area to the north (Fig. 456). Each lot has a road frontage of 250 meters, and a depth of 1,000 meters, giving it a size of 25 hectares, about 62 acres (Fig. 457).

On the lot selected for observation is an occupied clearing of about two acres, here designated Roçado Santa Rosa. It is not certain that the occupant holds title to the property or that he is conscious of the form and extent of the property unit. Most of

the land near the road in this lot and in the others on both sides has been cleared and abandoned recently enough to be now covered by second-growth woods (*capoeira*), not high forest. The present clearing has been occupied not more than a year.

The land is an undulating upland with brown clay soil underlain by deep red subsoil. A small valley through which flows a stream crosses the lot

The settler has a burro for transportation. The wood cut from this clearing was of second growth, a fairly dense mixed stand of small broad-leaved trees, the larger ones 6 or 8 inches in diameter. Across the road is a newer clearing made by another settler in larger second-growth woods or possibly virgin forest of the valley slope, giving a greater yield of charcoal per acre but also involving greater labor

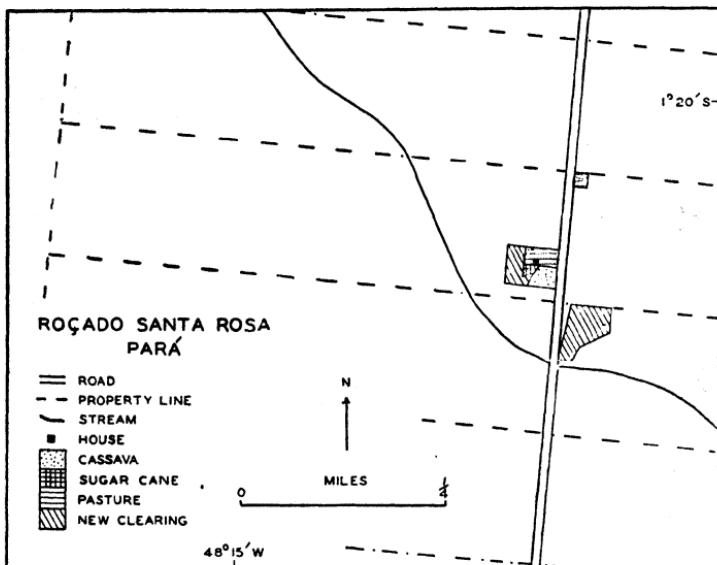


FIG. 457.—Projected farm and occupied clearing in Colonia Santa Rosa.

on its way to the coast. The present clearing is on the upland close to the edge of the valley. South and west of the clearing the land slopes off fairly steeply to the stream 40 feet below; on these slopes the virgin forest has not been cut.

The first and perhaps the most important crop has been harvested in making the clearing—wood for charcoal, cut and burned in numerous carefully constructed piles (Fig. 458), to be marketed in the village on the railway 8 miles away and ultimately in the city of Belém 40 miles away.

and the more difficult problem of cutting down and dissecting large forest trees with light unspecialized tools.

The wood cut and piled and the brush burned off, agriculture follows. In Roçado Santa Rosa, half an acre is occupied by cassava (mandioca), the principal farm product of the district. This great starchy root crop probably originated in the Amazon basin and is the chief contribution of the region to world agriculture. Cultivation is of the hoe type, planting in holes made by a mattock, and weeds are cut with

a machete. The crop requires about eighteen months to mature from the beginning of a rainy season in January to the end of a second rainy season in August the following year. The yield is large, about five tons per acre. The product has several other advantages: it can be harvested at leisure, keeping well in the ground; it is available

thatched shed in which three or four people work with simple equipment. This fact indicates that there are a good many settlers scattered along the road and a marketable quantity of cassava.

In the clearing of Roçado Santa Rosa, the only other crop is sugar cane in a small patch. This is no more than

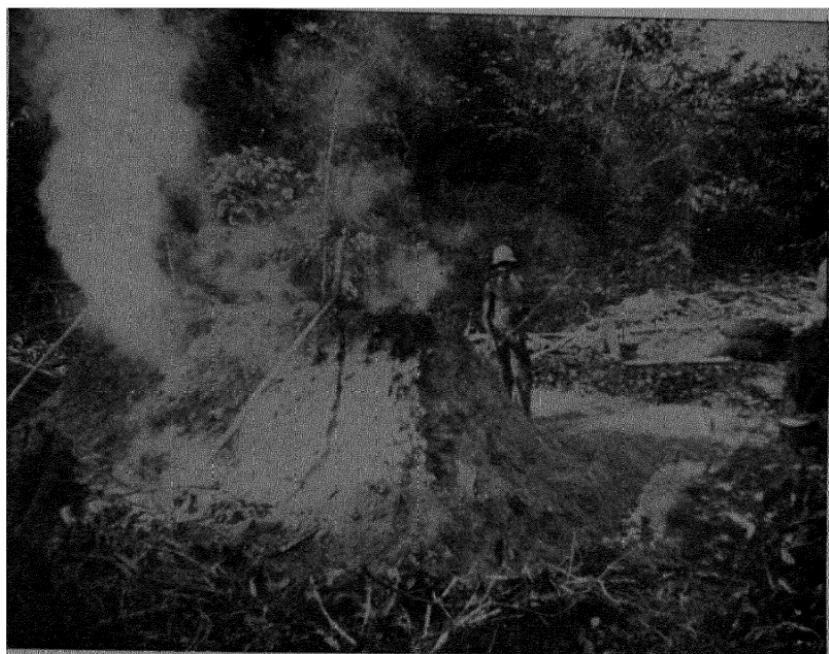


FIG. 458.—Farmer burning charcoal in his clearing, Colonia Santa Rosa. Second-growth forest (*capocira*) in the background.

through the year as the mainstay of family food supply; and it is a staple market commodity for consumption in Belém or for export, if there should be a surplus.

Production in the community has passed the primitive subsistence stage. The processes of pressing, straining, and boiling to reduce the root crop to starchy flour are not household operations but are performed at cassava mills. There are at least two mills on the road in the vicinity, each an open

enough for home supply. In some other clearings of the community, there are larger patches and there is a mill, on the same small scale as the cassava mills, where *cachaça*, the staple alcoholic beverage of the district, is made.

The farm pasture is nothing but a bushy yard in which the buco grazes. In the new part of the clearing, probably more cassava will be planted and some beans. Older dwelling places along the road have a clump of fruit trees and other plants around the house—

plantains, oranges, mangoes, and assai palms. But there are none here. The dwelling is an unshaded hut of light wood, wattle, and thatch in which there is a closed cubicle for sleeping (between an anteroom inside the front door and an alcove for cooking inside the back door), and a lean-to for an oven outside (Fig. 459).

**ROTATION.** Even though the house may be occupied for some years,

to distinguish and uncover the struggling crop as growth progresses, becomes finally more difficult than the making of a new clearing, in which the soil is fresh and weeds are not established. Moreover, the valuable crop of charcoal from a new clearing is not to be forgotten.

After abandonment, a period of 10 years is quite sufficient to prepare the land for a new harvest of charcoal

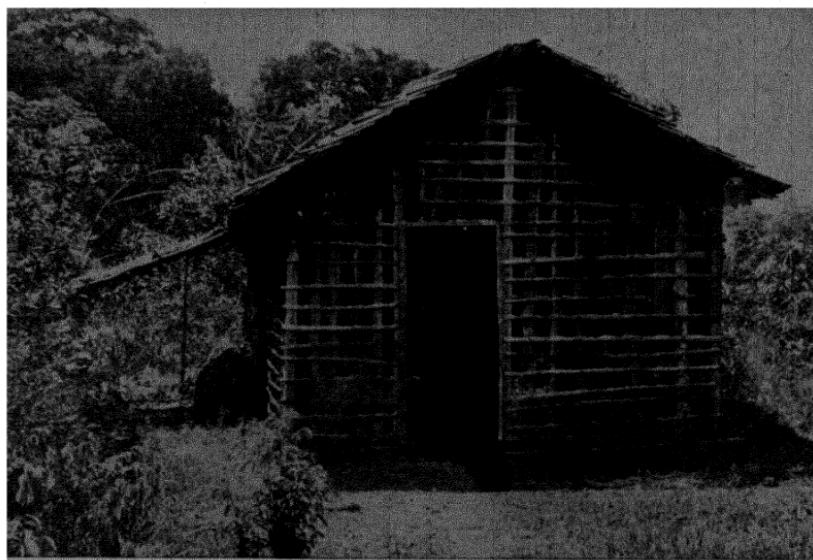


FIG. 459.—House in the occupied clearing, Roçado Santa Rosa. The house is of open lattice except for a small inner room. Kitchen oven under lean-to on the left. Second-growth woods behind house, selva beyond. View looking west.

enough for fruit trees to grow up, the field will be abandoned after one crop or at most two crops. It is easier to make a new clearing than to maintain an old one. After the first harvest the crops grow less vigorously; weeds become established and grow more vigorously in competition, reducing the crops if not smothering them completely. Here where there are no plowing and no cultivation of the ground itself, the cutting of weeds with a machete, repeated in attempts

and farm products. The system might almost be considered a rotation of two crops. Evidently more than one cycle has passed along the road of Colonia Santa Rosa; old land has been reoccupied. Thus, a system of settlement has been maintained, quite unlike the plans that probably allowed for farms of 60 acres completely and permanently developed, rather than clearings of 2 acres along the road used temporarily by drifting settlers. The system has present balance and stability in it,

nevertheless—greater practical wisdom, possibly, than paper projects are likely to have.

**IMMIGRATION.** The most vigorous recent project for more substantial farm development has been in connection with Japanese immigration. One of the concessions on the railway was for Japanese settlers. A much greater

Pará. Japanese immigration was restricted even in prewar times; there is no telling what will come in postwar times.

Perhaps the kinds of rural occupancy represented by Fazenda São Sebastião and Roçado Santa Rosa are not to be superseded in the immediate future but await a revision of national econ-

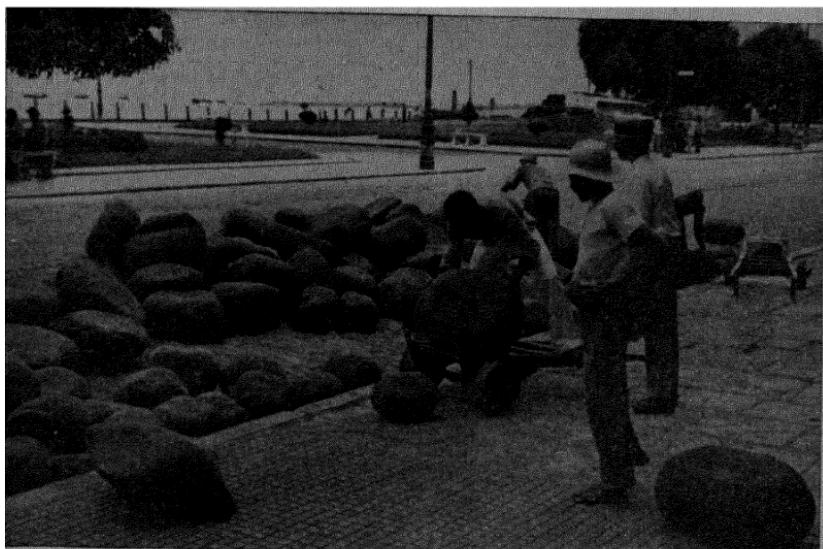


FIG. 460.—Billets of rubber on the water front, Belém, Pará. The amount gathered from Amazon forests has been small in recent years. Under pressure, it could be increased several fold, but still wild rubber would be almost negligible in supplying the world demand.

Japanese project was started in a large tract south of Belém, accessible by launches on the Rio Acará (Fig. 456). Here rice, cotton, and sugar have been produced intensively on large areas by industrious and well-organized settlers. Though successful production has been demonstrated, the ultimate success of the project is to be gauged not by an absolute judgment of the site itself but by relative judgments involving other regions and international relations. Japanese settlements in São Paulo have been more successful and attractive, drawing off laborers from

economy for Brazil, which in turn probably awaits a revision of world economy.

Both the fazenda and the *roçado* are in the environs of Belém, even though they are separated from the city by miles and hours of intervening Amazonian land and water. They furnish local subsistence to a city of which the basic hinterland lies much farther away, up the Amazon and its tributaries, and of which the primary function is to serve as the port through which the forest resources of that hinterland reach the outside world (Fig. 460).

10. TAPAJÓS<sup>1</sup>

## FORD RUBBER PLANTATIONS

## a. BOA VISTA

Four hundred miles from the sea up the Tapajós is Fordlandia, formerly up the Amazon is the mouth of the known as Boa Vista [Fig. 402(10)]. The

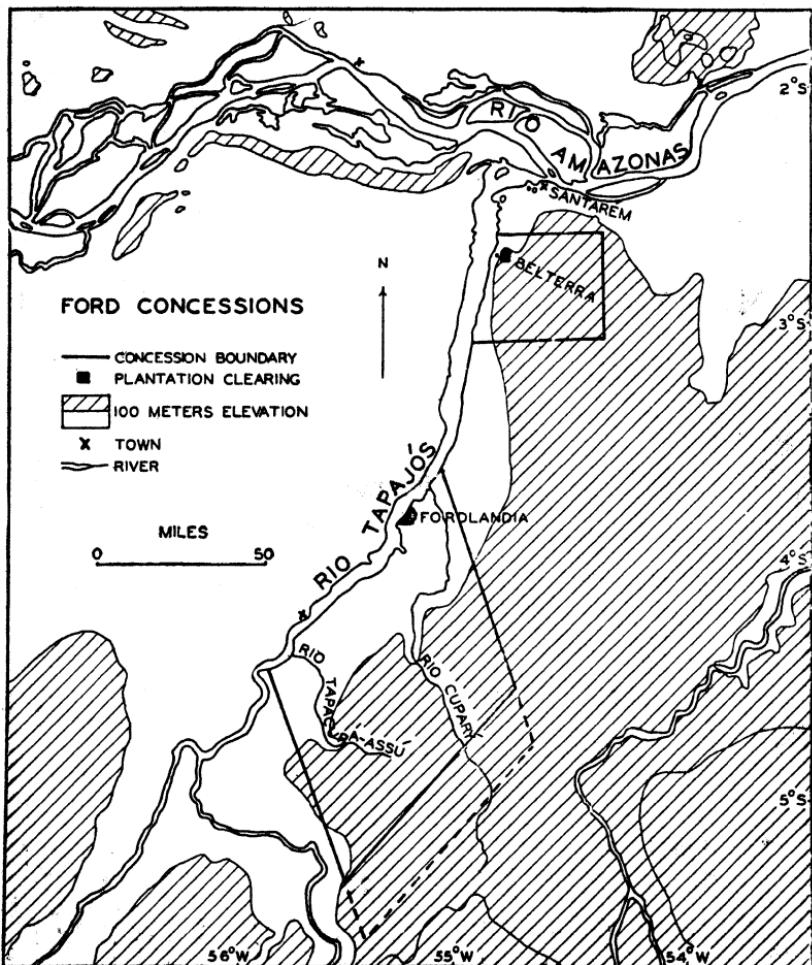


FIG. 461.—Concessions for rubber plantations on Rio Tapajós.

tributary Rio Tapajós, and almost one hundred miles from the Amazon

original Ford concession has a frontage of 60 miles along the southeast bank

<sup>1</sup> Field work in October, 1935.

of the river and an inland extension of about 70 miles, approximately to the divide between the Xingú and the Tapajós drainage basins (Fig. 461).

Smaller rivers, navigable for small boats through parts of their courses, cross the concession to the Tapajós. Equatorial rain forest covers the land.

there was no other so substantial as that of Boa Vista, and no other clearing so productive.

The establishment was one of forest production in a large area and subsistence farming in a small area. The house occupies an attractive terrace site beside the river, surrounded by

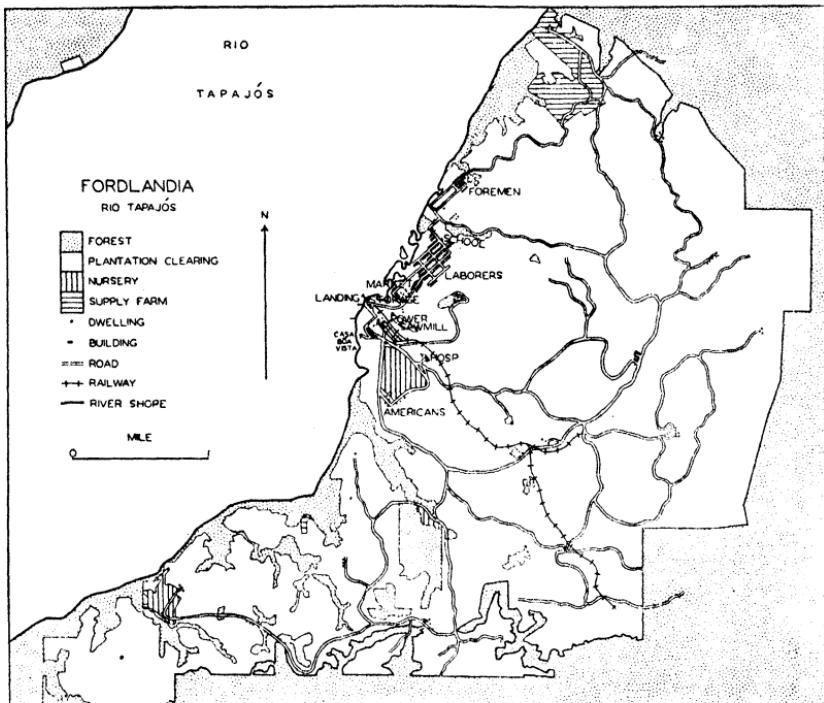


FIG. 462.—Original upriver Ford site of Boa Vista, renamed Fordlandia, and area cleared for rubber.

**OLD HOUSE.** Plantation clearing has extended over less than half of 1 per cent of the area, over 8,000 acres in a total of 2,000,000 acres. Clearing has been localized in a tract fronting on the Tapajós near the northern end of the concession (Fig. 461). The place was the site of an old fazenda house, Boa Vista. The concession contained several such fazendas and many old houses, probably 100 or more, in small clearings along streams. But probably

small fields and pastures. On a slope of the valley bluff, rising behind the house, is a planted grove of rubber trees, about twenty-five years old, the same age as many other small groves along the lower Amazon and its tributaries, relics presumably of the last great rubber boom when rubber trees were planted with sudden enthusiasm and then forgotten with the sudden collapse of the boom. Though neglected and untapped, these groves

have not ceased growing. But none has grown better than the hillside grove at Boa Vista. The place appears suitable for the start of the Ford plantations.

**CLEARING.** From the landing place at Boa Vista the new plantations extend over a great irregular clearing of 12 square miles, along the river for 4 miles, and inland about 3 miles (Fig. 462). The land is extremely hilly,

of rubber seedlings stretch away over hill and dale in every direction (Fig. 463). Originally, almost all the land was planted indiscriminately. But the plantations have not all grown equally well, and recently there has been topographic selection, to eliminate the plantings on poor sites. From an original total of 8,000 acres about 1,000 acres have been abandoned. Sites that have proved to be relatively

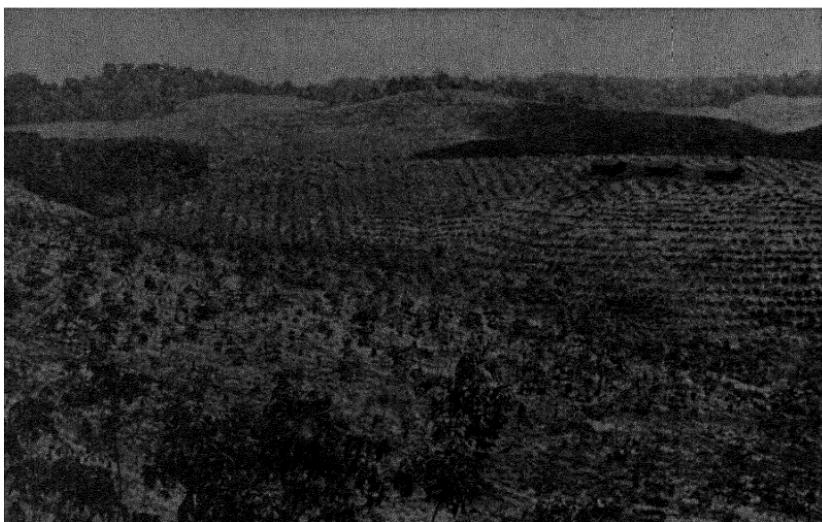


FIG. 463.—Rubber plantation clearing, Fordlandia. Original planting of Brazilian seedlings, covering dissected hill land. Laborers' houses on near-by ridge. Selva in the background. View in the southeastern section of the plantation looking south.

in contrast with the small smooth terrace fields close to the old fazenda house. A dendritic network of ravines forms a pattern with an average relief of 300 feet in a quarter mile and average maximum slopes of 30 degrees. The hills are covered with deep heavy red or brown residual soil. A few outcrops of crystalline rock indicate that the area is within the northern part of the Brazilian highlands.

In spite of the great surface irregularity, almost all the land has been cleared, and forest has been superseded by plantations in which straight rows

unsatisfactory and are abandoned in the worst instances include valley bottoms where drainage is poor, hill-tops subject to excessive wind exposure and drought, isolated precipitous slopes where erosion is accelerated, and isolated patches of sterile stony soil. Thus a varied landscape has developed, including patches of bushland and grassland as well as remnants of forest.

A system of roads, primary and secondary, winds up hill and down, ramifying to all parts of the area (Fig. 462) and particularly giving

access to groups of laborers' dwellings distributed to provide approximately one group of a dozen family dwellings in each two square miles of plantation area (Fig. 463). Most of such house groups are on hillsides above a spring or shallow well. The road system focuses on the landing place of Boa Vista.

LUMBER. In addition to the roads, there is a standard-gauge railway

three feet in diameter, their trunks fairly straight and free of branches and their crowns forming a shade beneath which undergrowth is not very dense. The fact that the trees of the Tapajós keep their leaves and grow throughout the year, in contrast with the deciduous trees of Michigan, is not very important in railway lumbering. But certain other differences are significant: the mixture in the rain forest contains

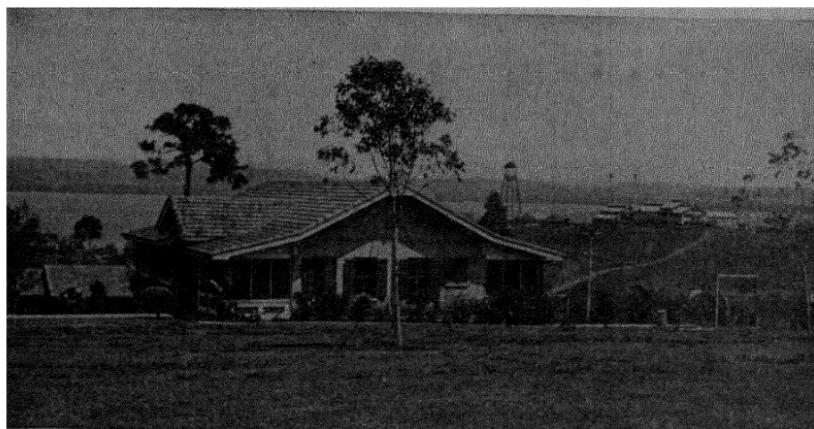


FIG. 464.—Manager's house, of imported materials, Fordlandia. Sawmill at the right. Rio Tapajós in the background. Site of the old clearing and rubber grove of Boa Vista on the river bank in the left background. View looking west.

system ramifying similarly from a point near the river. The railway preceded the road system and was not so extensive. Outlying sections of it have been abandoned, and some of its grades are now used as roads. Its purpose was to carry timber cut in land-clearing operations to a sawmill near the landing place (Fig. 464). Both sawmill and logging railway are like similar Ford Company installations in northern Michigan. For lumber operations, some of the circumstances in the Tapajós rain forests are like those in the Michigan hardwood forests. In both cases, there is a mixed stand of broad-leaved hardwood trees about one hundred feet in height and two or

many more species, a hundred in place of a half dozen, with a much greater variety of timber qualities; in the rain forest, on the average, the wood is a little harder, the trees a little larger, and the undergrowth a little denser than in Michigan. Moreover, the terrain in the vicinity of Boa Vista is much more rugged than is commonly the case in Michigan forests.

The lumbering enterprise on the Tapajós was undertaken with knowledge of the circumstances and significant differences. However, it was well-nigh impossible to evaluate all the differences. Timber was cut, transported to the mill, sawed into lumber, and graded. But costs were relatively

high; the bewildering assortment of peculiar woods was largely unfamiliar to the lumber trade; and the quantity of each kind was too small to be effectively introduced in foreign markets, particularly as a new product in depression years. Therefore, after a period of activity in which stocks of lumber were accumulated and some shipments were made, the sawmill closed down. Even if it does not operate again, it represents an experiment of some value.

**SETTLEMENT.** Near the old fazenda house, there is a cluster of modern establishments in addition to the sawmill. All but the sawmill are intended to supply the usual living requirements of a modern community established in connection with the lumber and rubber-plantation enterprise. They include the power plant, pumping plant, machine shops, and warehouses near the dock; streets lined with dwellings for a laboring force, a street of dwellings for white-collar workers, a hilltop suburb for a managerial staff (Fig. 464); stores, school, recreation hall, and playing field to complete the workers' village; clubhouse, tennis courts, and golf links to complete the managerial suburb; a hospital on a separate hill; and a radiotelegraph station.

The community depends on foreign sources for many of its supplies, but importation is reduced by utilizing local products as far as practicable. The power plant uses wood as fuel. Brick as well as lumber are produced locally for building purposes. It was planned to give the community an approach to self-sufficiency in food supply, and for this purpose livestock and fruit farms were established near the villages. The livestock farm is on gently sloping land close to the river and the fruit farm on an adjacent hillside where the soil is light. Both farms are equipped and organized in modern American style, but neither has been successful. The livestock problems of disease and malnutrition

have not been met by standard American methods, and it has been found that local farmers along the river employing local methods can furnish livestock products in abundance more cheaply than can the company farm. Fruit also can be obtained more cheaply from other local sources than from company orchards. Therefore, the livestock farm is now abandoned, and the fruit farm is given over to a tenant who furnishes some produce.

**RUBBER.** Not only in lumbering and farming but also in some other activities, lessons have been learned. Presumably the most important of these activities is rubber growing, for which the enterprise was established. The plantations were started from seeds gathered in Amazonian forests, and these seedlings are approaching the age at which rubber production might begin. But such trees are not now considered efficient plantation producers. More efficient stock developed in the East Indies by horticultural methods has been obtained in the form of clones supplying wood for grafting on Brazilian roots. Thus, the original plantings are considered merely as a root basis for grafted trees to be grown hereafter. The establishment now includes not only a nursery of several acres where seedlings grow for a year before being transplanted to their places in the plantation, but also a small plot of East Indian clones to grow and provide twigs for grafting. The nursery and clone plot is on a hillside at some distance from headquarters, selected for its gentle slope and fertile soil.

Mention has already been made of the abandonment of plantings in some sorts of sites, poorly drained bottoms and exposed hilltops, experience having shown these to be unfavorable. Meanwhile, it has been realized that the ruggedness of the whole tract is an unfavorable circumstance, responsible for problems of transporta-

tion and plantation work to be reflected in higher costs when rubber production should begin. Presumably, the reason for the original selection of the Boa Vista site was rather slight, based on rapid reconnaissance along rivers in small boats, with observation of shore features and slight penetration of forests. Therefore, after a period of plantation experience, exploration has been carried much farther. It has been found that deeply dissected hill country is characteristic not merely of the riverward margin of the Ford concession in the vicinity of Boa Vista but also of the whole great area for 60 miles along the river and inland to the divide. Moreover, exploration out-

side the concession in the Tapajós basin has revealed that downstream much nearer to the mouth of the river there is an undissected upland within a few miles of the riverbank, offering more favorable plantation sites, close to tidewater, accessible by deep-draught ocean-going vessels, which cannot ascend the river as far as Boa Vista.

Negotiations between the Ford Company and the Brazilian government resulted in an agreement by which the company gave up an inland strip of its original concession and received in exchange an equivalent acreage in a new concession, Belterra (Fig. 461).

#### b. BELTERRA

The new Ford concession is at tidewater on the Rio Tapajós 15 miles upstream from the Amazon. It has a frontage of 30 miles along the east side of the river and an inland extension of 30 miles.

**SITE.** As at Boa Vista, there are old dwellings and small clearings at isolated places along the river. The pioneer Ford camp is on a terrace beside the river at the site of a little old trading post, a site recommended by a large spring of good water (Fig. 465). Inland from this point the land rises in low hills in a zone of dissection five miles wide. Here is a trial clearing of about ten acres on an undulating terrace of light soil a hundred feet above the river, a clearing in which plantation growth has not been very satisfactory.

Beyond the clearing is a precipitous escarpment rising to an elevation of 500 feet above the river. Its rim is almost unbroken for many miles, and only one small ravine offers a way for a steep road leading from the Ford landing place up to the summit. This is the rim of the undissected upland extending inland for an unknown distance, a plain without lines of

surface drainage. The greatest relief is in rounded hollows about twenty feet in depth, apparently sinkholes, and even these are few and far between. The soil is a deep brown residual clay of such granular consistency as to be distinctly pervious to water. There are no rock outcrops and no erratics in the upland, although there are outcrops of sedimentary rock, particularly sandstone, below the escarpment rim. Selva like that at Fordlandia is the natural vegetation.

**OLD PLANTING.** This upland so recently explored and made known to the world at large has been known to local people for a long time. There are not only old clearings on the riverbank a few miles away but also several old clearings on the upland itself near its western rim (Fig. 466). One such clearing is a plantation about twenty-five years old containing 3,000 rubber trees in an area of twenty acres. This has become the first rubber-producing unit of the Ford enterprise and provides an opportunity for developing a system of production. The system that is being tried has a background of Oriental plantation experience on the part of American staff members and a

background of wild rubber gathering on the part of Brazilian laborers. Five rubber gatherers live in a hut on the plantation. Each man taps 300 trees a day, so that each tree is tapped every second day (Fig. 466). To avoid

smoking process, and these are collected in the afternoon, as one of the odd jobs to be performed after other work is done. The product is accumulated in a warehouse to be shipped away when convenient.

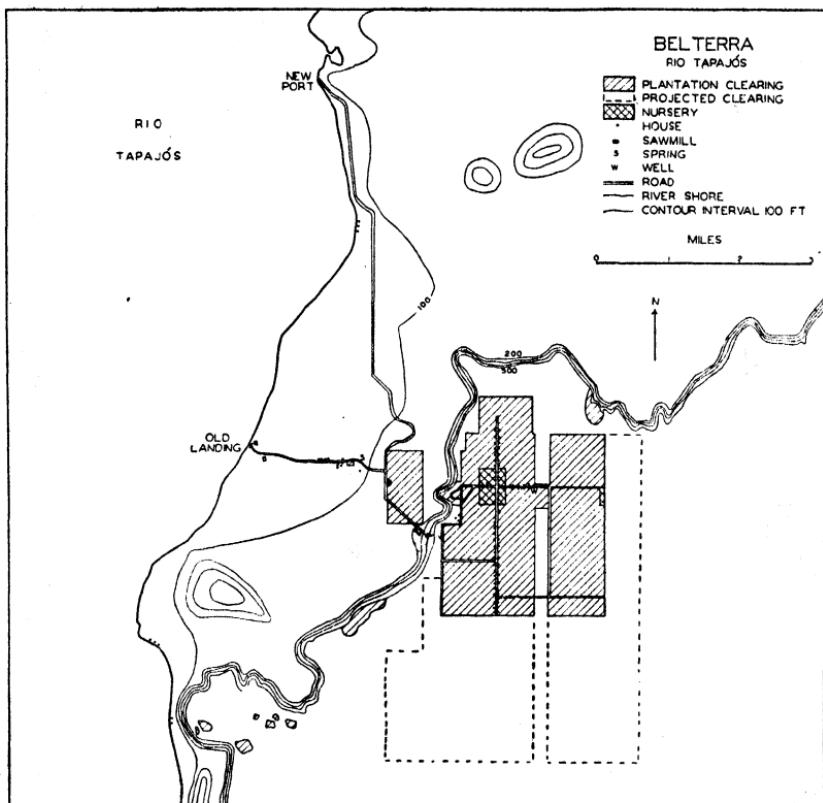


FIG. 465.—New Ford site of Belterra, and area cleared for rubber. Unshaded areas are occupied by selva, which here contains no significant stands of wild rubber.

injury to trees a small cutting instrument of recent design is used, and cutting progresses regularly over the lower parts of trunk surfaces. The same schedule prevails every day through most of the year: tapping trees from six to nine o'clock in the morning, collecting latex from nine to eleven, and smoking the latex from one to two. Certain nuts found in the forest are considered best as fuel in the

**NEW CLEARING.** Meanwhile, the development of new plantations is progressing. Five square miles have been cleared and planted, beginning near the northwestern corner of the upland and proceeding eastward and southward in successive rectangular blocks (Fig. 465). A tract of 40 acres is cleared by a gang of 20 men, early in the drier part of the year, between May and October. Two weeks are

required for felling the forest growth, large trees and small, and the slash is left on the ground to dry for 2 months. Then it is set afire, and under good conditions all but the larger timber is consumed. Under unfavorable condi-

After burning, a week is allowed for cooling, and then the area is cleared by piling and burning movable timber (Fig. 467). Holes are dug and left to air for 3 weeks. Finally, in the rainier part of the year, seedlings are planted,

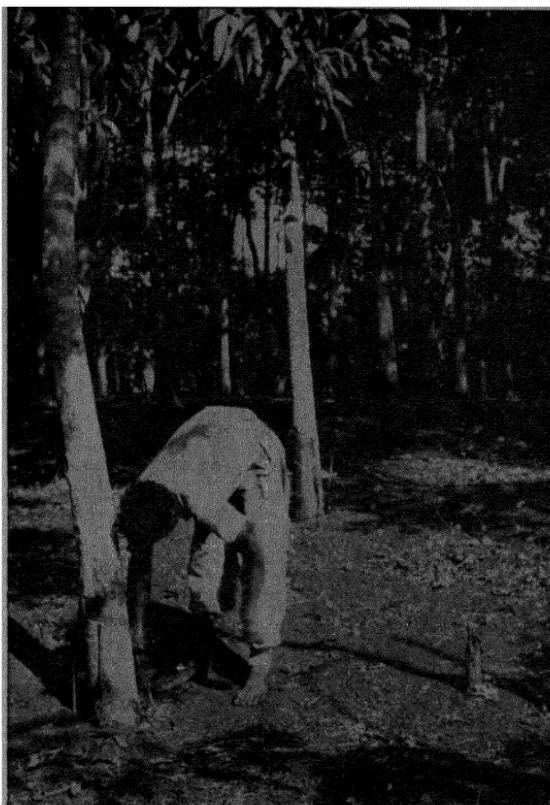


FIG. 466.—Rubber gathering in the small, 20-year-old plantation of a former settler, Belterra. Laborer adjusting latex cup after cutting a new line in the bark at the lower edge of the tapped surface.

tions when the burning is poor, the place may have to be abandoned until a second growth has appeared and can be cut and dried for another attempt. Even in the drier part of the year, fire burns itself out at the edge of cutover areas and does not enter surrounding forests, except on rare occasions of protracted drought.

15 feet apart, 220 trees per acre. As the trees grow, it is planned to thin the stand to 100 per acre.

Seedlings for planting are produced in a nursery of 140 acres in the upland near its threshold (Fig. 468). Seeds are brought from wild rubber trees of the lower Amazon, preferably from the forested western part of Marajó



FIG. 467.—New clearing after felling, drying, and burning. Gangs beginning supplementary clearing after period of cooling. The recent "burn" still smoldering in the background. Selva bordering the clearing. View looking southeast.



FIG. 468.—Spraying the nursery plantation of Brazilian rubber seedlings, Belterra. Houses of local wood and thatch in the background. Selva border in the distance.

Island at the mouth of the river, where there is a strain of rubber tree apparently immune to prevalent Amazonian pests.

In due time, it is planned to bring clones of the East Indian stock from Fordlandia to provide twigs for budding on the seedling roots and thus grow trees of high producing quality.

The processes of clearing and planting require the labor of one man for 2 acres. Thereafter, maintenance of the growing plantation requires only one man for 40 acres, to cut weeds and attend to ailing trees. After 5 years or more of waiting, more labor is needed again, one man for 6 acres, to carry on the processes of rubber production.

The present stage at Belterra is that of clearing and planting. For this, there are a labor force of 800 men and a staff of six Americans.

**SETTLEMENT.** The pioneer camp near the landing place has a house for the superintendent and his wife, a house for the other Americans, a hospital, a store, and a shelter for transient laborers. In the first clearing on the upland, there are houses for regular laborers, a store, a warehouse, and several small tanks for water supply. Water has been brought by truck from the valley spring to the tanks on the upland. Recently, however, a well has been sunk in the upland to a depth of 400 feet, and this is expected to provide water for all purposes.

Operations have been on a more economical scale than in the earlier

experiment at Fordlandia. Instead of American style houses built of imported materials, there are houses of Amazonian design, built of local material, framed of timber obtained in the clearing process, and roofed with palm thatch gathered in the forest. Instead of a large sawmill to produce fancy lumber for possible export, there is a portable sawmill in the upland to provide lumber for building purposes from suitable timber obtained in the clearing process.

The landing place is at a shallow point on the river and is unimproved. Instead of dredging and building here, it is planned to develop a deepwater port when needed at a point 10 miles downstream, near the northwestern corner of the concession, where the water is deep close to shore and improvement will be cheap and easy. A road has already been built to connect this place with the road system of the present camps and clearings (Fig. 465).

The plantations of Fordlandia and Belterra as now developed should be capable of supplying all the rubber needed in Brazil. Potential plantations at Belterra, realizable through continuance of an active planting program to cover available land in the concession, might conceivably supply all the rubber needed in the world. Presumably, the question of whether or not these plantations will produce for Brazil or for the world will not be answered by people and circumstances on the Rio Tapajós but by world events.

## 11. BOCA NEGRO

### a. CASTANHAL MANAUS<sup>1</sup>

Following the collapse of the wild rubber boom in the Amazon basin a generation ago, the city of Manaus suffered years of depression [Fig. 402(11)]. But the depression period is

long since past and well-nigh forgotten, except by faraway strangers who have never heard anything else about the metropolis of the Amazon (Fig. 469). Moderate prosperity in recent years

<sup>1</sup> Field work in November, 1935.

has depended in considerable part on trade in castanhas (Brazil nuts). The demand for this delicacy in world markets has increased greatly, and the supply has been increased correspondingly by more extensive gathering operations in upriver forest areas tributary to Manaus.

**FOREST NUTS.** The castanha tree is a large member of the equatorial

border have none of it. Some of the areas where the tree is absent are like those where it is present, in natural-site conditions, so that apparently irregular distribution is not due entirely to ecological conditions but is also a matter of specific migration. In the vicinity of Manaus, there is an upland area apparently suitable for the growth of the tree. Although



FIG. 469.—Northwestern end of the water front, Manaus, in the season of low water. Ocean-going vessel at floating dock in right foreground. Brewery and ice plant in upper center. Air view looking north.

rain forest, a broad-leaved evergreen about 150 feet in height, like an oversized walnut tree in appearance. It is scattered among other trees in the mixed forest of well-drained upland areas. Although scattered, it is by no means evenly distributed; rather is it highly localized, fairly plentiful in some areas, and absent in others. For example, certain places along the Madeira and others along the Rio Negro are well-known as sources of castanha, whereas the upper Amazon and its tributaries beyond the Peruvian

Manaus is the market center for the nuts from a great tributary area—near by as well as far away there are upland areas of the sort suitable for the growth of castanhas—there are no castanha trees in forests near the city.

Castanhas may be planted as a domestic producer. Until the present time, production has depended on wild trees instead of on plantations. Presumably, the reason is that the market has been adequately and economically supplied from forest stands, a fact giving little or no incentive to start

cultivation. One tree in the forest produces 500 pounds of nuts per year, in shells containing 12 to 22 nuts each, ripening in the rainier season between December and June and falling to the ground where they can be gathered with ease in good condition, the relatively low cost of production being thus accounted for. With demand

road penetrates inland across an upland previously uninhabited and covered with virgin forest.

The *castanhal* property is a tract of 800 acres, in which 140 acres have been cleared (Fig. 470). The land is an undulating upland surface of about 100 feet above the river, 150 feet above sea level. A few sharp ravines cut the

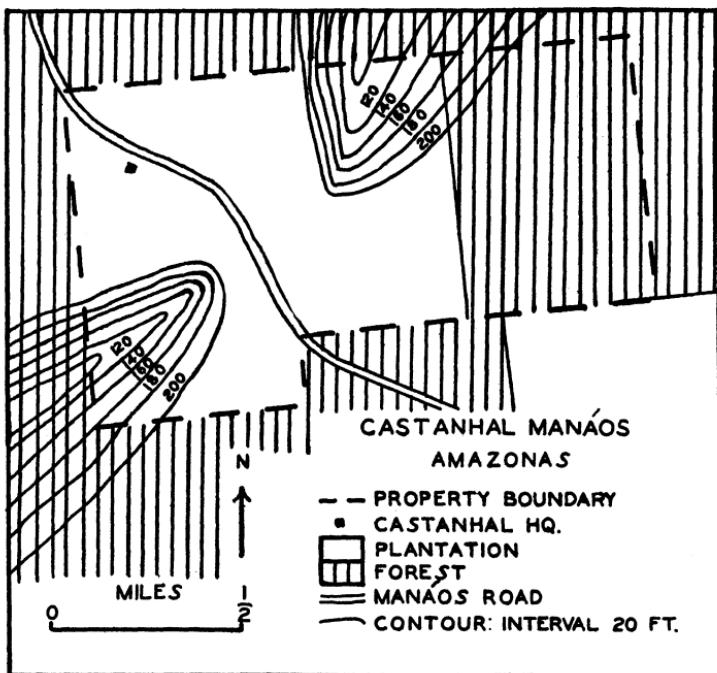


FIG. 470.—A municipal plantation of Brazil nuts.

increasing and drawing already on the most remote headwater sources of supply, the time for changing from forest gathering to horticulture may be at hand.

**PLANTATION.** The Castanhal Manaus is a new establishment belonging to the city of Manaus, 10 miles northeast of the city limits. It is on a road to Lago Aleix, one of several new roads that now for the first time give the city overland connection with at least a few outlying forest settlements. From the city on the edge of the valley the

upland surface, giving high relief and steep slopes in some parts of the area. The soil is friable brown clay.

Five thousand castanha trees have been planted in the clearing (Fig. 471). The seedlings are started in a nursery at a small fazenda near the city and are planted out when 1 year old. Thereafter, the only maintenance work needed is the cleaning of weeds with a machete once every 6 months. A manager and two laborers live at the plantation and perform this work. Most of the trees are now 4 years

old and are expected to begin bearing in about 6 years.

Near the municipal *castanhal*, another similar enterprise has been established by private interests. Perhaps these enterprises presage a transformation in an Amazonian industry from forest to plantation production, equivalent to the transformation in

rubber production a generation ago, the change in this case taking place within the same region of production. On the other hand, it is not certain that the enterprise will be successful or that regional supplies and world demands are providing the conditions for such a basic change in industry.



FIG. 471.—*Castanhal Manaus*. Young Brazil nut tree in right foreground; cassava cover crop in left foreground; manager's house; selva bordering the clearing in the background. View looking north.

#### b. CORDERO, FOREST CLEARING<sup>1</sup>

For many years, there was only one road extending from Manaus into the forest that hemmed in the city. Along this road, there are numerous small isolated clearings. At one time or another, most of the virgin forest has been cleared and later succeeded by second-growth woods (*capocira*).

Sitio Cordero is a newly made clearing about ten miles north of Manaus (Fig. 472). It is on the gently sloping side of a small valley near

where the road crosses a stream flowing in the valley. The 2-acre clearing is surrounded by second-growth woods about fifteen years old; previously, the site was covered by similar woods (Fig. 473). The clearing has been made by cutting down trees and bushes in the dry season, leaving them to dry for several weeks, burning over the area to consume slash, and gathering the remaining larger sticks into six piles.

<sup>1</sup> Field work in October, 1935.

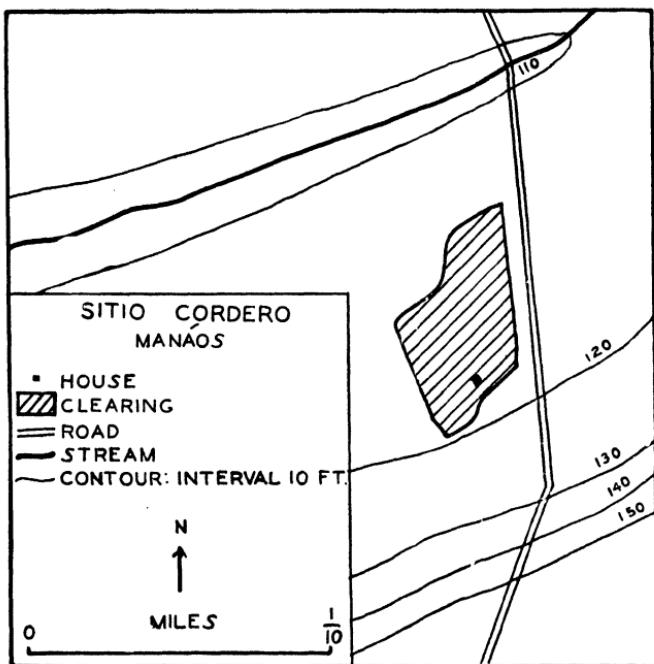


FIG. 472.—A charcoal farmer's clearing.

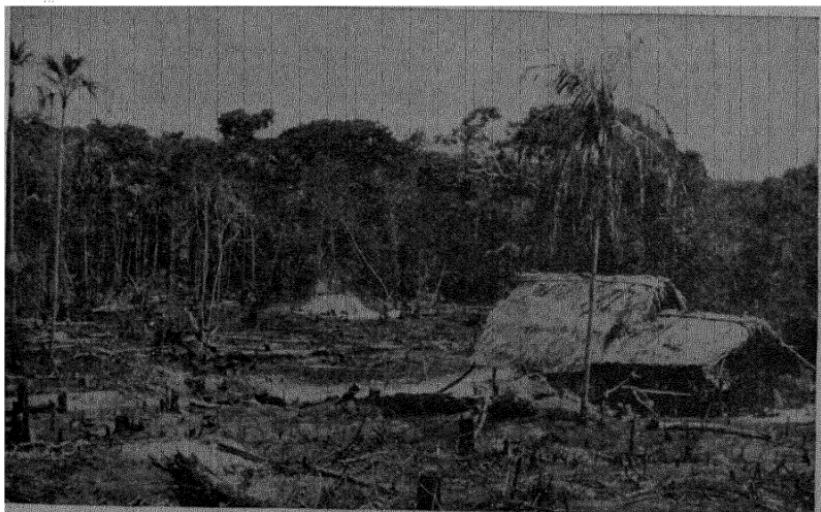


FIG. 473.—Sítio Cordero. New clearing after felling, drying, and burning. Palms saved for poles and thatch, though singed by fire. House built after fire. One of the charcoal piles ready to burn in the background. Some supply crops planted and sprouting but not visible in picture. View looking north.

These piles furnish charcoal, the first and perhaps the most important product of the clearing. They are carefully constructed in layers of poles below and sticks above, covered with earth and ignited to burn 3 weeks. The various kinds of forest hardwoods are used, but not palm trees. Each pile of 10 cubic yards produces half a ton of charcoal. This is bagged and

After the cassava harvest the house and clearing are abandoned, and the occupants move elsewhere. The same spot can be reoccupied after the wood has had 10 years in which to grow.

The settler and his wife are squatters who have come from farther up the Amazon (Fig. 474). They are Brazilians of mixed Negro and Indian stock.



FIG. 474.—The Cordero family in front of their new house.

marketed in Manaus. After the end of the dry season, cassava is planted in the clearing, grows for 18 months, through two successive rainy seasons, and is then harvested and marketed in Manaus. A garden patch of beans, pineapples, and other food crops is planted for family supply. A hut framed of poles and covered with palm thatch houses the occupants.

Probably their families belonged to the rubber-gathering population of the river. This is the second clearing that they have made since moving to the vicinity of Manaus, and probably they will make another when this has yielded its two crops. They are self-reliant people, capable of meeting their problems and supplying their needs; they are leading a contented life.

#### C. BOA FORTUNA,<sup>1</sup> A FLOOD-PLAIN ISLAND FARM

People at Manaus speak of Careiro Island in somewhat the same way that

people at Pará speak of Marajó Island—as an unusual place of produc-

<sup>1</sup> Field work in November, 1935.

tive cattle farms not far from the city. The upper end of Careiro Island is 10 miles below Manaus, at the confluence of the Rio Negro and the Rio Solimões, forming the Amazon (according to Brazilian nomenclature). From this confluence the island extends downstream for 40 miles between the main Amazon on the north and a side channel, Paraná Careiro, on the south.

island interior (Fig. 475). Originally the frontage along the *paraná* was about  $2\frac{1}{2}$  miles in length and the depth inland about the same. In recent times, part of the frontage along the *paraná* has been disposed of, leaving a frontage of half a mile on the *paraná* and a large block of interior land behind the natural levee. The total area is about three thousand acres, but for fazenda purposes only

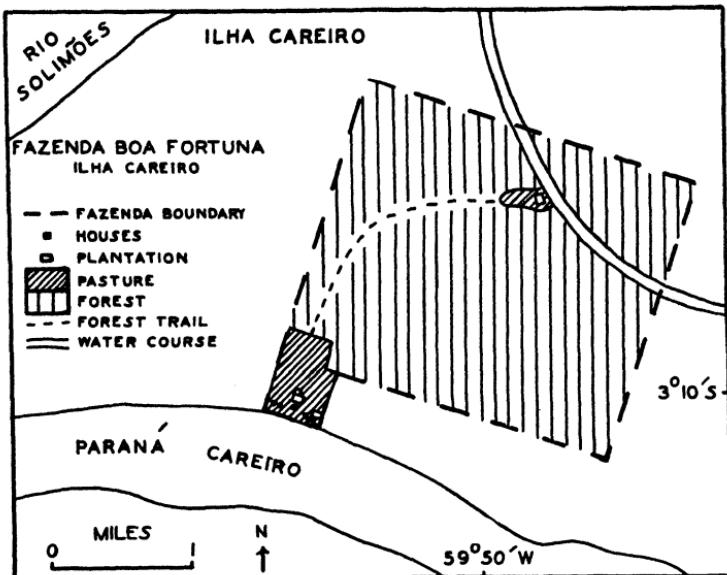


FIG. 475.—A dairy farm on a flood-plain island.

Unlike Marajó, this island is not a worn-down upland, lower at its margin and higher in the central part, but a flood-plain island bordered by natural levees and lower in the central part. The soil is heavy alluvium, the natural vegetation equatorial rain forest of the flood-plain variety, approximating mixed upland forest on the higher natural levees and merging into tangled swamp forest of smaller trees and fewer species in the interior.

Boa Fortuna is one of a long line of fazendas fronting on Paraná Careiro and extending into the lowland of the

natural levee part is of much significance. The area of levee along the *paraná* is about two hundred acres. In addition, there is another bit of natural levee along a small flood-plain channel that cuts across a farther corner of the interior tract (Fig. 475).

The natural levee along the *paraná* is cleared of forest (Fig. 476). In fact, it has been cleared and kept clear for so long a time that there are no signs of former forest and no local memories of clearing.

Most of the cleared area is occupied by native grass; it is separated into

several pastures by barbed-wire fences. Cattle are kept here all the year round, with very little seasonal differentiation. In the drier season, from May to October, there is moisture enough to keep the grass green; in the rainier season the river very rarely rises high enough to flood the highest part of the levee. In occasional years, there are exceptional floods covering

Within the pasture clearings, there are several small plantations of minor importance. Two of these are groves of rubber and cacao trees, the rubber forming shade for the cacao. These date from the Amazon rubber boom of about thirty years ago. The rubber trees have never been tapped, and the cacao is harvested only for home supply. Presumably, the decline of the



FIG. 476.—Base of ceiba tree, largest tree of the forest, Fazenda Boa Fortuna, left standing in a pasture after clearing smaller trees from surrounding acres on back slope of natural level. Dairyman on horseback at right. View looking northeast toward swamp forest.

the pastures along the *paraná* for short periods, and at such times the cattle are driven through the forest to the small interior levee clearing for temporary refuge.

The herd contains about twenty milch cows of crossbred stock, one-quarter Holstein-Friesian and three-quarters *criollo* of early Colonial importation (Fig. 477). The product of the fazenda is fresh milk for the Manaus market, transported by a small steamboat that makes a round trip daily, stopping at each of the fazenda landings along the *paraná*.

Amazonian cacao market with the rise of other better cacao regions has left such small groves without commercial value. Of the other three patches of plantation, one contains cassava and corn for home consumption and includes a small primitive mill for making cassava flour; another containing bananas and pineapples is near the dwelling house; the third, also containing bananas, is in the far clearing in the forest.

The dwelling house of the owner, on the levee near the *paraná*, is the only substantial building on the fazenda.

It is a frame bungalow elevated on piles above flood danger. The owner and his family are white Brazilians of Portuguese descent, well-educated and familiar with modern affairs though never having traveled outside the Amazon region. Thatched huts house

the families of two laborers, who are Amazonian Brazilians of Negro blood.

The fazenda is not a modern dairy farm according to North American standards, but it is an efficient productive establishment effectively filling its place in its region.



FIG. 477.—Cows in corral, Fazenda Boa Fortuna. Grass pasture on the natural levee; flood-plain forest on lower land behind the natural levee in the background. View looking north.

#### *d. AMAZON RIVER FISHING<sup>1</sup>*

The confluence of the Rio Solimões and Rio Negro is well-known for the conspicuous mixing of the clear black water of the Rio Negro with the muddy brown water of the Solimões to form the Brazilian Amazon (Fig. 478). From an airplane at an elevation of 1,000 feet the two waters are sharply defined. At the surface of the river, the line is not difficult to locate. Precisely at the junction are fishermen drawing their nets. Their operations are very localized—in the Rio Negro as close as possible to its junction with the Solimões.

**SITE.** All these fishermen fish in the same place because the best fishing

is here. A fisherman's explanation is that here they catch fish from both rivers instead of just one. Because they fish entirely on the Rio Negro side and apparently do not give the Solimões fish a chance to reach their nets, this explanation seems inadequate. An alternative hypothesis might be that there is a congestion of Rio Negro fish at this point, drifting downstream with the current but turning to swim upstream when they reach the Solimões in order to keep out of the mud, preferring their own clear black water. It is well-known that there is a marked localization of certain kinds of fish in certain parts

<sup>1</sup> Field work in November, 1935.

of the river system and that many fish are sensitive to local differences in their water environment.

The fish caught at this point are of several kinds belonging to species peculiar to the region but of an assortment similar in appearance, habits, and food quality to small fish similarly caught in North American waters.

tied to each canoe, the net itself held by the captain standing in the larger canoe. At a word the canoes are paddled in opposite directions, the larger one out into the stream, the captain paying out the net as his canoe circles to form a circular enclosure (Fig. 479). The water is about 50 feet deep, and the net, 40 feet wide, does

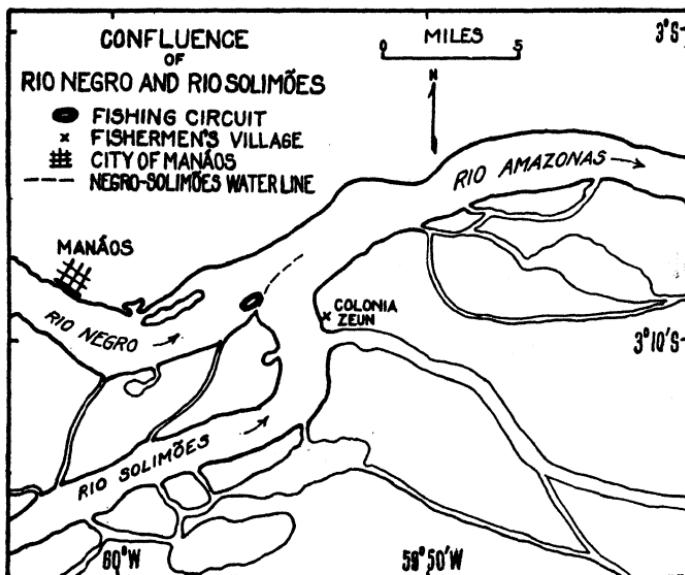


FIG. 478.—Fishing site below Manaus.

**ROUTINE.** Daily, soon after dawn, fishermen from Colonia Zeun (Fig. 478) and a few from more distant villages congregate at the favored spot. Occasionally, they get in each other's way, but generally all keep clear by following ordinary rules of polite behavior. The equipment is standardized and the routine specific. Four men with two canoes and a seine 90 feet long operate in a circuit that is completed once every eight minutes more or less. They start at a point about one hundred yards above the confluence, the two canoes together, a paddler in the bow of each, one end of the net

not reach the bottom. Probably some fish escape below, and certainly some escape above, jumping far and wide over the heads of the fishermen. The paddlers splash and shout as they come together to close the gap; and when the canoes collide, all join in hauling in the net. The bulk of the fish are bagged and brought in over the side in the style approved by fishermen generally (Fig. 480). In the course of the haul the canoes have drifted down to the junction of the black water with the white. Thence they are ready to paddle up the Rio Negro to the starting point, to repeat the circuit.

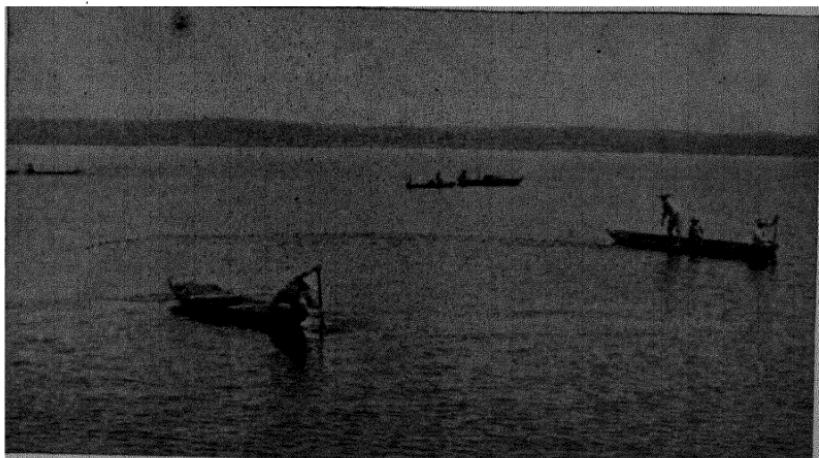


FIG. 479.—Fishermen paying out the net and circling to meet. Two other teams in the background. View looking north from a motorboat, toward the north shore of the Rio Negro.



FIG. 480.—Fishermen from Colonia Zeun making the haul at the end of a circuit, confluence of the Rio Negro and Rio Solimões.

Fishing continues for several hours, until canoes are loaded. Generally, before noon they have a good catch, a thousand pounds more or less, and are ready to start the product on its way to market. The fishermen of the Colonia Zeun paddle to the water front of their village across the Solimões and there pack the fish in ice to await the arrival of a small steamboat running daily on a local route. This takes the cargo to the Manaus market to be sold on the same or the following day.

**VILLAGE.** Colonia Zeun is on the natural levee of a flood-plain island, at a place relatively stable and above all ordinary floods of the high-water season. The people of the village are settlers who have come in recent years from Ceará. They represent the well-known exodus in years of drought, from the populous land of famine to the spacious land of food. Before coming, most of them were not *jangada* fishermen but miscellaneous laborers. Here they have turned to a resource easily utilized with small capital. The canoes are built by the fishermen, of wood that they cut in the forest. The nets are made and owned by the leading citizen of the village, who specializes in this equipment and shares in the catch.

**VARIATIONS.** Activity varies with the seasons. Conditions for fishing are moderately good at the time the present field observations were made, in November, the latter part of the low-water period. The following season, of high water, from December to June, when the rivers leave their banks and spread over the flood plain, is a poorer time for fishing. The fish are more widely dispersed, and some of the fishermen scatter to fish with hand lines on flood-plain feeding grounds.

Then follows the best fishing season, as the waters recede and fish become concentrated in flood-plain lakes and channels. At this season, attention is

focused on the most important fish of the Amazon, the pirarucú—important because of its abundance and wide distribution from Pará to Peru, its large size, commonly 100 pounds or more, and its excellent food quality, fresh or dried. It is taken in flood-plain lakes, generally with spears, a method requiring skill born of experience, putting the fishermen of Colonia Zeun under some disadvantage.

The ease of drying the pirarucú and its satisfactory flavor in preserved form are important qualities in a region where there is no refrigeration except at or near Manaus. These qualities have extended its use throughout the year and throughout the region. It is a prominent item of domestic commerce not only along the river but also down to the coast. A canoe loaded with bundles of pirarucú is a characteristic sign of local trade—bundles accumulated at trading posts and shipped to the larger markets.

Also, the flood-plain lakes and channels swarm with alligators, but these are worthless for food and almost worthless for leather. Sometimes they are hunted along the Rio Negro and the Solimões, mainly for sport or as a menace to livestock.

In addition to fishing with nets, lines, spears, and guns, other less sporting methods are sometimes resorted to. Occasionally, fishermen of Colonia Zeun, at the end of a morning of poor fishing, use a dynamite bomb to fill their boats with low-grade product. Indians of the district from time immemorial have been accustomed to use the juice of the timbó (barbasco) plant, thrown into small pools or streams to stupefy fish so that they rise to the surface and can be taken with dip nets. Indians and their ways of life are more in evidence upstream in the headwaters of the Amazon, where they have been mentioned in connection with the Andean countries.

12. JAUATÓ<sup>1</sup>

## AN AMAZON FOREST TRADING POST

Jauató is a trading post on the Rio Solimões, 300 miles above Manaus and 100 from the western boundary of Brazil [Fig. 402(12)]. The site of the post is a point at which the river

A trail leads inland from the post to a small settlement which is the central headquarters for the gathering of forest products. There are no castana trees in the area; but there are

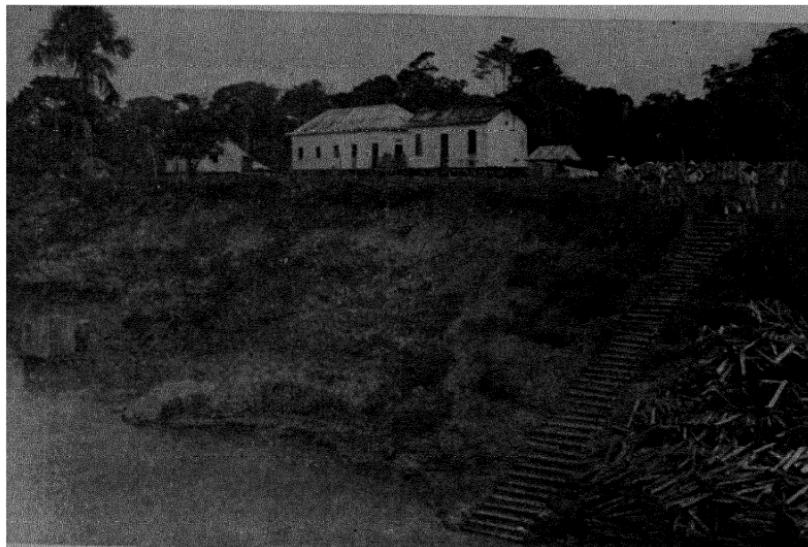


FIG. 481.—Water front at the trading post of Jauató. Post buildings of wood and galvanized iron in a clearing on the upland plain, at a point where the Amazon (Solimões) impinges directly on the valley bluff (without a flood-plain intervening). Cordwood for steamboat fuel at the right, forest workers above, selva bordering the clearing in the background. View looking southeast from the deck of a river steamboat, at low-water season.

touches the side of its valley and thus provides a bit of upland having a water frontage (Fig. 481). Upstream and downstream from the post and across the river are great areas of forested flood plain shot through with minor channels, lakes, and swamps (Fig. 482). The upland is about fifty feet higher than the flood plain, and its surface is a smooth plain extending inland from the post, covered with equatorial rain forest.

rubber trees on the upland, and these are systematically tapped. There are about ten rubber gatherers in the settlement, and among these the surrounding forest is divided. Paths are laid out from rubber tree to rubber tree, each path in a loop about four miles in length, reaching 200 trees; for a man can traverse that distance twice in a morning, first tapping and later gathering the latex from that number of trees. There are twice as

<sup>1</sup> Field work in November, 1935.

many paths as there are rubber gatherers; each man, therefore, has two paths and traverses one each day, to provide for the tapping of each tree every other day. The drier part of the year is the season of rubber gathering.

A second activity, which can be carried on closer to the post, is that of woodcutting to supply fuel for the

to kill forest animals for their skins and meat. The animals include deer, jaguars, anteaters, sloths, and monkeys, but the only valuable skin obtainable in commercial quantities is that of the peccary. Bundles of these skins are carried to the post to be exported to North America, to be made into pigskin leather.

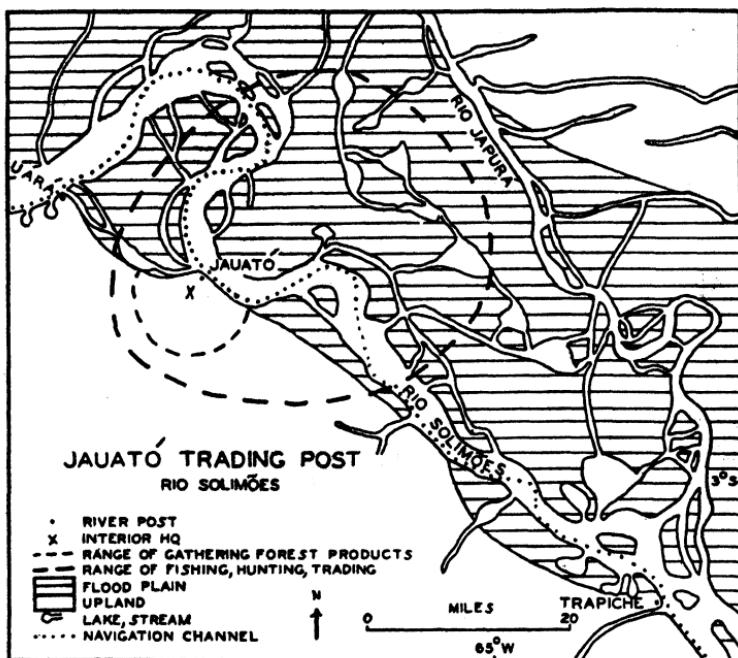


FIG. 482.—Vicinity of Jauató, and the range of post activities.

steamboat that ascends the river once a month en route from Manaus to Iquitos. All the men of the settlement assemble for the monthly event of loading the steamboat with wood enough to carry it along for 2 days (Fig. 481).

There are several other post activities for which the range is much greater than for rubber and wood gathering. One of these is hunting, carried on in the flood plain as well as in the upland to distances as great as 20 miles from the post (Fig. 482). Shot guns are used

Another productive activity is that of fishing. Several kinds of fish can be caught, but only one is of commercial importance—the pirarucú, caught in flood-plain lakes when waters recede at the close of the rainy season. The process of drying is accomplished by spreading the fish on platforms in the sun, either at a place in the flood plain near the fishing grounds or at the post.

A final activity of the post is trading—sending out its forest products in exchange for supplies. A small store at the post is visited by people of

the settlement and others living along the river. The stock includes dry goods, hardware, and groceries, all on a very meager scale. There is no other store in the vicinity. The tributary area extends upstream and down for about twenty miles, halfway to the nearest similar establishments upstream at Uará and downstream at Trapiche (Fig. 482). The latter is a somewhat larger settlement than Jauató, for it is near the mouth of the Japurá and receives some trade from that great tributary.

The trader at Jauató is a Portuguese who came to Brazil twenty years ago

and has progressed up the Amazon to this point. He has acquired a proprietary right to land fronting on the river for a distance of 40 miles and extending inland indefinitely. He is not a great businessman; if he were he probably would not be located at such an insignificant post. Nevertheless, he is capable of handling the problems of production and trade that he has to meet and is kindly in his contacts with the forest people over whom he has some control; he is honest in his dealings with his people and with the outside world.

### 13. PERPETUO SOCCORRO<sup>1</sup>

#### AN AMAZON FRONTIER TRADING POST

Perpetuo Socorro is 2,000 miles upstream from the mouth of the Amazon and within 30 miles of the

of the upland plain, at a point where the river impinges against the foot of the bluff on one side of its valley

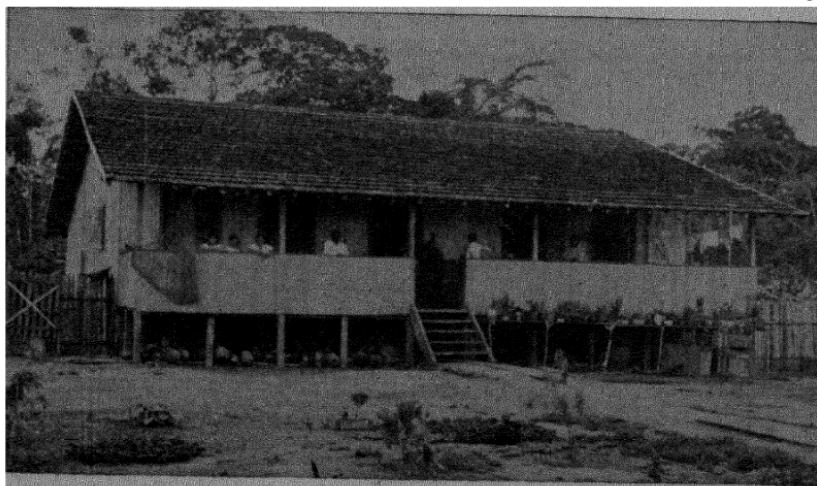


FIG. 483.—Trading-post building, Perpetuo Socorro, in an upland clearing, facing the river. Balls of crude rubber stored under the porch. View looking northwest from the river bank, toward selva bordering the clearing in the background.

western boundary of the nation [Fig. 402(13)]. It is a trading post in a forest clearing on terra firma, solid ground

(Fig. 483). Several acres have been cleared around the trader's house, and in this are patches of bananas, cassava,

<sup>1</sup> Field work in November, 1935. R. S. PLATT, Conflicting Territorial Claims in the Upper Amazon, "Geographic Aspects of International Relations, Harris Foundation Lectures 1937," pp. 248-251. University of Chicago Press, Chicago, 1938.



FIG. 484.—House and landing place of a forest worker near the post, Perpetuo Socorro. Supply crops in a small clearing; pirarucú drying on a rack in front of the house; forest bordering the clearing.



FIG. 485.—Ticuna Indian women and children on the riverbank while their men load steamboat firewood and cargo, Perpetuo Socorro. Barge for Brazil nuts tied alongside steamboat. View east across the Amazon (Solimões).

sugar cane, and corn to provide food for the inhabitants. Upstream and down from the main building, houses are strung along the riverbank, 14 in all, each in its own little clearing with its own patch of bananas, cassava, cane, and corn to supply the family (Fig. 484).

The trader is a Portuguese who has lived in Brazil for many years and has

them in two and attaches some of them to Lima or Bogotá to the west and some to Rio de Janeiro on the east coast of the continent.

The activities of the post reach out in various directions and across various boundaries. The nearest activities are around the post itself: subsistence farming in the clearings carried on by the men, and hammock making of

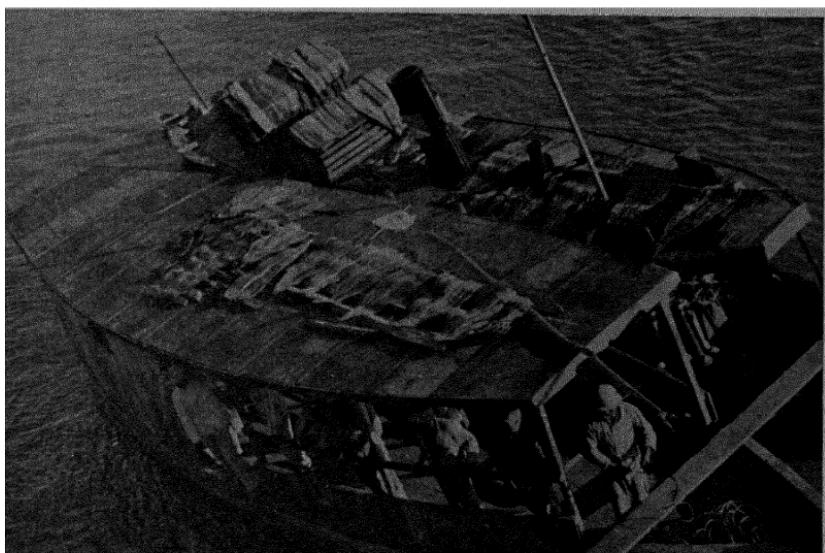


FIG. 486.—Trading-post launch and barge on the Amazon near the western boundary of Brazil. Pirarucú drying on the roof.

progressed up the Amazon. The junior partner also is Portuguese. Their wives are of Indian extraction, at least in part. The other families at the post are of Indian blood but consider themselves Brazilians and speak some Portuguese. The other inhabitants of the vicinity, who come to the post to trade and occasionally to work, are Ticuna Indians not speaking Portuguese and not considered to be Brazilians (Fig. 485). The territory of the tribe extends beyond the established national boundary. Its members are not conscious of the jurisdictional demarcation that theoretically cuts

palm fiber by some of the women, to supply the need for beds. The next activity is that of woodcutting at the edge of the surrounding forest to provide fuel for the river steamer, which calls monthly on its trip from Manaus. A fourth activity is that of fishing in flood-plain lakes along the opposite side of the Amazon, where the catch is pirarucú, to be dried and shipped to markets up or down the river (Fig. 486). A fifth activity is in the forest along the tributary stream west of the post, where the Indians gather rubber and hunt peccaries. The products, rubber balls (Fig. 483)

and skins, are brought by canoe to the post, paid for with cloth and knives,

two steam launches (Fig. 486). Every month, one of these is dispatched to the

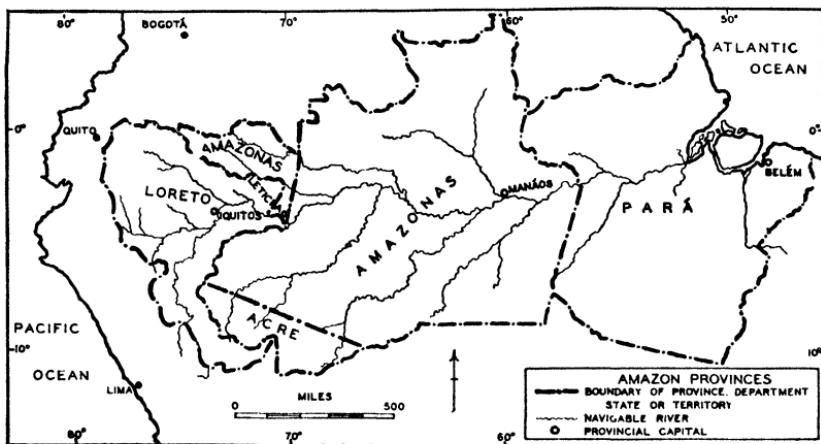


FIG. 487.—Amazonian capitals and provincial areas. States of Pará and Amazonas, and territory of Acre, Brazil, on the east; province of Loreto, Peru, on the west, and territory of Amazonas, Colombia, on the north.



FIG. 488.—Flood-plain forest on the bank of the Amazon, near the Brazilian-Peruvian boundary. Infrared photograph from a river steamboat.

and shipped down to Manaus and ultimately to the North Atlantic.

A sixth activity extends far beyond the range of canoes. The trader has

Putumayo, crosses the boundary into Colombia, and continues up the river trading on both sides of the Peruvian-Colombian boundary, reaches a station

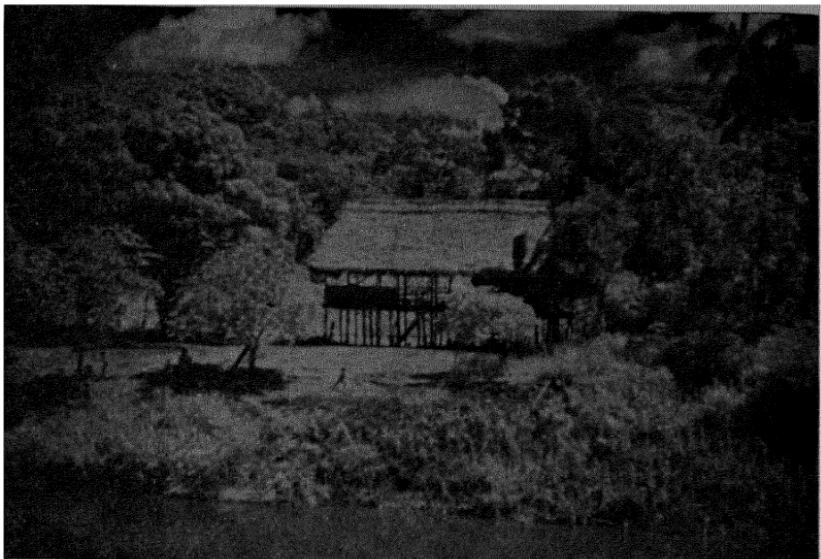


FIG. 489.—Indian house on the bank of the Amazon, near the Brazilian-Peruvian boundary.  
Infrared photograph from a river steamboat.

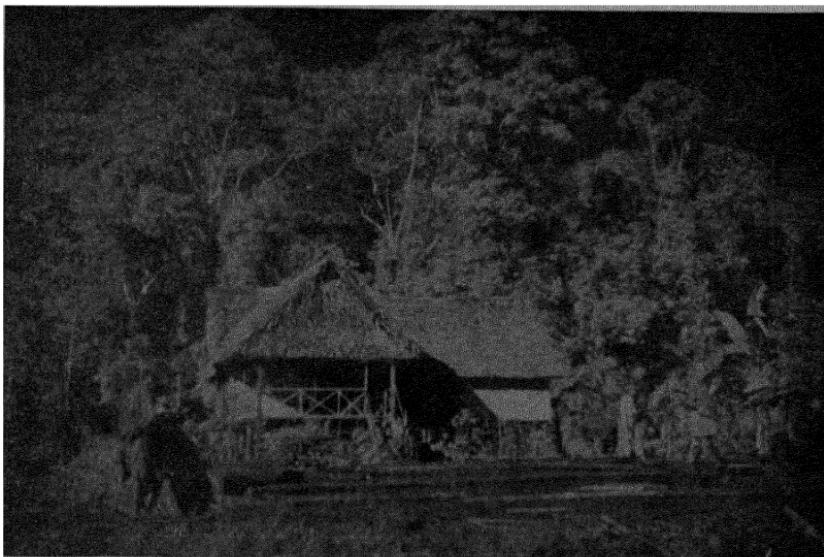


FIG. 490.—Trading post on the Amazon, Atlántida, Peru, near the Brazilian boundary.  
Infrared photograph from a steamboat tied alongside.

at Igara Paraná, and then returns to Perpetuo Socorro, making a round trip of 1,000 miles, carrying a cargo of rubber and skins to be shipped by the steamer down to Manaus. The other launch is dispatched every month to the Javarí and trades similarly along the Peruvian-Brazilian boundary, then returns similarly to make the connection for Manaus. Each takes a voyage of about a thousand miles, bringing back cargo that is transhipped

downstream a thousand miles to agents at Manaus and thence transhipped downstream the last thousand miles and abroad to world markets.

This and preceding Brazilian studies in the Amazon evidently deal with the same outlying region of equatorial lowlands touched upon in other chapters. In fact, Perpetuo Socorro is close to places earlier described in Colombia and Peru (Figs. 487 to 490).

# Chapter XI. Latin-American Habitats and Economies

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The preceding chapters are arranged with reference to the countries and colonies of Latin America, taken in order from Mexico to Brazil. The field studies are grouped in chapters according to nationality, and for each country the studies are arranged to begin in the core region and to proceed thence to outlying regions.

Up to this point, such an arrangement seems justifiable. It is commonly and reasonably assumed that countries are worthy of interpretation, as distinct entities having their own individual characteristics. The peculiar national individuality that distinguishes every Latin-American country from every other is, in each case, rooted in a unique assortment of land and people.

Each country receives its character and recognizable marks of distinction from its people inhabiting and using its territory. People occupying territory are organized primarily in small economic units, such as are described in the field studies. Therefore, the field studies seem to belong with their countries, adding to the broad national generalizations some intimate details of the national fabric.

**RECLASSIFICATION.** Nevertheless, throughout the preceding chapters there have appeared many facts not subject to national differentiation but awaiting some alternative classification. Types of land and people in Latin America do not differ sharply across national boundaries. It is only the assortment or grouping of land and people that is unique in each country. The various kinds of rural units that have been described, differing from each other in natural endowment, people, and activities, are not themselves peculiar to one political unit or another.

Evidence has multiplied to show how inadequate is the classification only by countries as a guide to full interpretation. Attention has been drawn repeatedly to the partition of outlying regions among countries and the consequent similarity of countries in their adjacent outlying parts, to the dissimilarity within countries between populous core regions and unoccupied outlying parts, and to the similarity among the populous core regions of different countries.

TABLE I.—FIELD STUDIES CLASSIFIED BY HABITATS\*

Occupation	Hilly highlands	Dry lands	Humid low highlands	Seasonally dry Costa	Chronically rainy lowlands	Humid middle latitudes
Farming	III. 1. Magdalena Altiplano 2. Jalapa III. 2. Sacatepéquez VII. 7. Motatán /fra VII. 8. Carmen /fra VII. 9(a). San José VII. 1. Chimalborazo 2. Cela Calle 6. Chichauairi 7. San Gerónimo 8(a). Pachacuti 17. Alto	II. 4. Tiahualillo 5. Verde 6. Mejía 7. Chichí IV. 4(a). Cul de Sac VII. 6(a). La Reforma VII. 4. Rincón and Chillón 8(b). Sotillo VIII. 1. Conchali 5. Asapa 10. Choche Chocel 11. Puyzillón X. 6. São João	III. 1(c). Plateau Costa S. Miraflores IV. 5. Peténville VI. 5. Víctor VI. 6. Rio del Rio VI. 9(b). Aguilar VI. 10(a). Dagua VI. 10(b). Quinaya VII. 10(c). Nicacio VII. 10(d). Trejo Hatico VII. 9. Andabamba VII. 10. Salapiede X. 1. Chapedío 2. Marilla	III. 1(c). Pacific Costa S. Miraflores IV. 5. Peténville VI. 1. Mariel IV. 6. Legane VI. 6. Curarao 4(a). Dominican (b). Puerto Rico, Jamaica 5. Martinique 6. Curacao 7. Bernardo VII. 4. Llano Guiana 7(c). Trapiche VII. 5. San Miguel VII. 13. Iata VII. 4. Ponta Grossa 8. Marajó	III. 1(c). Caribbean Costa Rica IV. 5. Constantia VI. 1. Mariel V. 1. Enviro. Hope V. 5. Pastore, Hope VII. 11. Victoria VII. 12. Sepa VII. 13. Aguruanas VII. 15. Payrote, Cahuique X. 16. Chinabote X. 17. Illesos 9. Santa Rosa 10. Tapiche 11(c). Castanh 11(e). Cordeiro 11(f). Bos Fortuna	VIII. 3. Llanquihue 6. Pirovano 7. Cabo Corri enes, Cha padinal 8. Zavala, Rot dán IX. 12. Uruguay
Gathering, hunting	II. 1. Magdalena Altiplano 2. Jalapa VII. 6. Chichauairi	VI. 6(a). La Reforma X. 7(a). Carnaubá	X. 2. Marilla	III. 6. Caladita Larga VI. 4. Nuevo Mundo X. 4. Ponta Grossa	VII. 11. Victoria 12. Sepa 13. Nany, Itaya 14. Boca Hallalga X. 9. Santa Rosa 11(b). Trapiche 12. Cordero 13. Jaunto 13. Perpetuo Socorro	VIII. 3. Llanquihue 9. Isla Scarl
Fishing	*			IV. 7. Bernuda	VII. 11. Victoria 12. Sepa X. 11(d). Boca Negro 13. Jausto 13. Perpetuo Socorro	VIII. 3. Llanquihue
Manufacturing	II. 1. Magdalena VII. 1. Chimalborazo	II. 6. Mejía VI. 6(a). Santa Rosa X. 7(b). Jangada	III. 3. Miraflores	IV. 1. Mariel 7. Bernuda VI. 4. Nuevo Mundo	VIII. 4. Maya	VIII. 6. Pirovano
Mining	II. 1. Magdalena Altiplano	II. 7. Chichí				

\* The habitat classification was devised after the studies were made, as an end product, and the numerical distribution is a chance by-product. The fact that the greatest number is in chronically rainy lowlands and the least in middle latitudes reflects an emphasis on the least familiar as compared with the most familiar. (Only stray items of manufacturing and mining that belong in the habitat classification are included here.)

Now reclassification based not on countries but on natural regions and styles of occupancy is in order. A frame of classification for rural

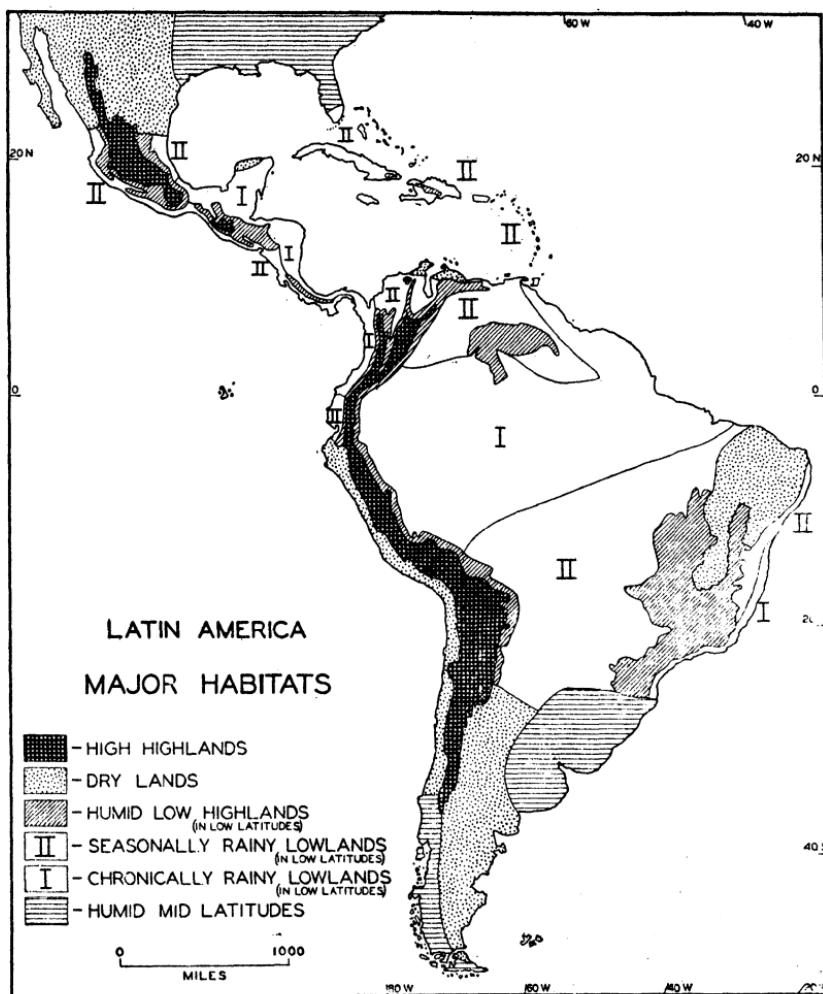


FIG. 491.—A map derived from that of "Climate Regions" (Fig. 4, page 12). Four symbols are the same as in the map of climates, and the changes consist in combining four dry climates under one symbol and two humid middle-latitude climates under another. The types are listed in the order of discussion.

communities (not those engaged in mining) is found in types of climate and sequences of occupancy (Table I, page 486).

HABITATS. Areal expression of the frame is provided by a map (Fig. 49!) derived from the earlier climatic map (Fig. 4, page 12). The

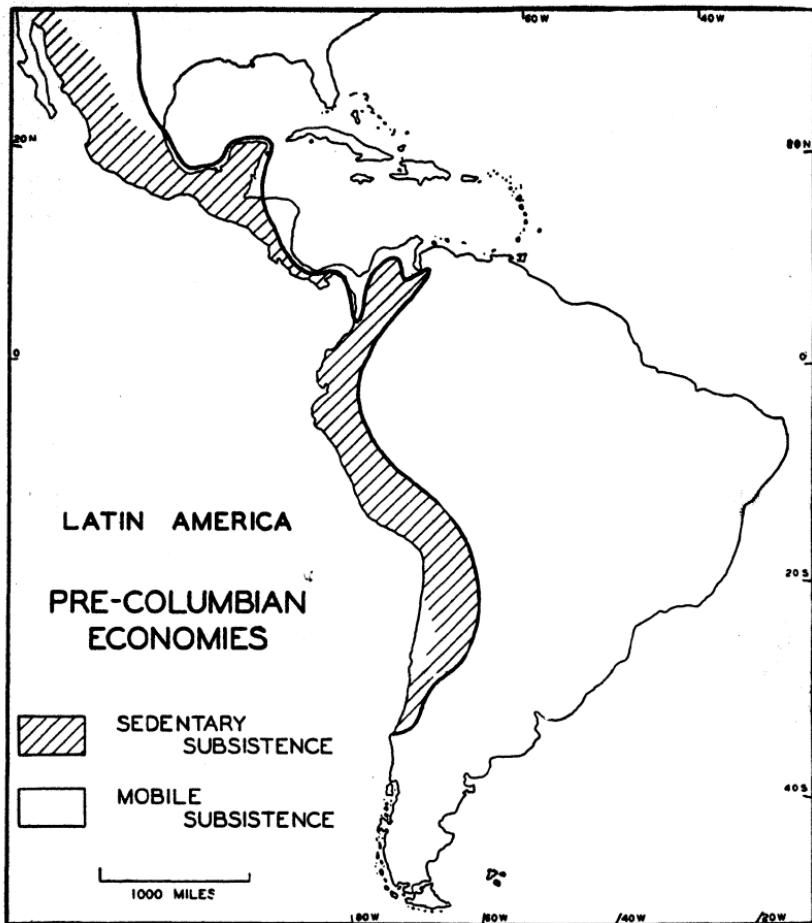


FIG. 492.—The heavy line represents a persistent division of Indian occupancy in the Americas. In many places, it is a sharp divide, but too intricate and unconfirmed to be shown with precision on the reconnaissance map. For example, the line on the map envelops the Peninsula of Yucatán, but actually a division between sedentary and mobile settlement is known to occur at the edge of the highlands in southern Mexico, leaving Yucatán as an island rather than as a peninsula of sedentary occupancy. Farther north in Mexico, the line is drawn at the edge of the highlands, although sedentary occupancy in the late Pre-Columbian Period, as indicated by the pattern on the map, fell short of that line. (Data from A. L. Kroeber, "Cultural and Natural Areas of Native North America," pp. 121, 222, Figs. 1A, 6, University of California Press, Berkeley, 1939; E. Nordenskiöld, "Sydamerika," J. A. Lindblad, Uppsala, 1919, p. 210; and field reconnaissance.)

justification for the name "Major Habitats" is the fact that rural land occupancy in Latin America may be divided into a half dozen types for

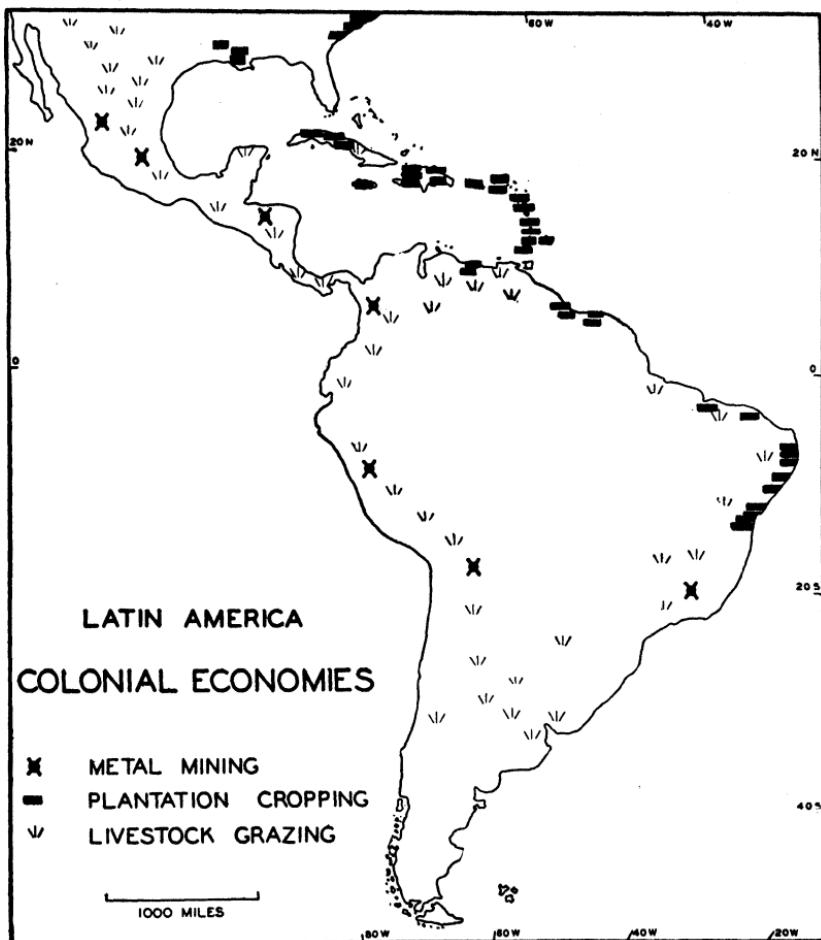


FIG. 499.—Economies of the eighteenth century. Negro slave plantations were mainly on the Atlantic side, but there were a few on the Pacific side not indicated on the map—on the Peruvian coast, for example. (*Data on areas of settlement from W. Sievers, Die Fortschritte der Erforschungen von Süd Amerika, "Petermann's Geographischen Mitteilungen, Tafel 11, J. Perthes, Gotha, 1900.*) The symbols are not quantitative.

general characterization and that in areal distribution these types correspond roughly with the broad climatic divisions shown on the map.

The direct association of types of occupancy with types of climate may seem to imply a theory of human culture determined by natural environment. Therefore, it is important to state that, in this volume,

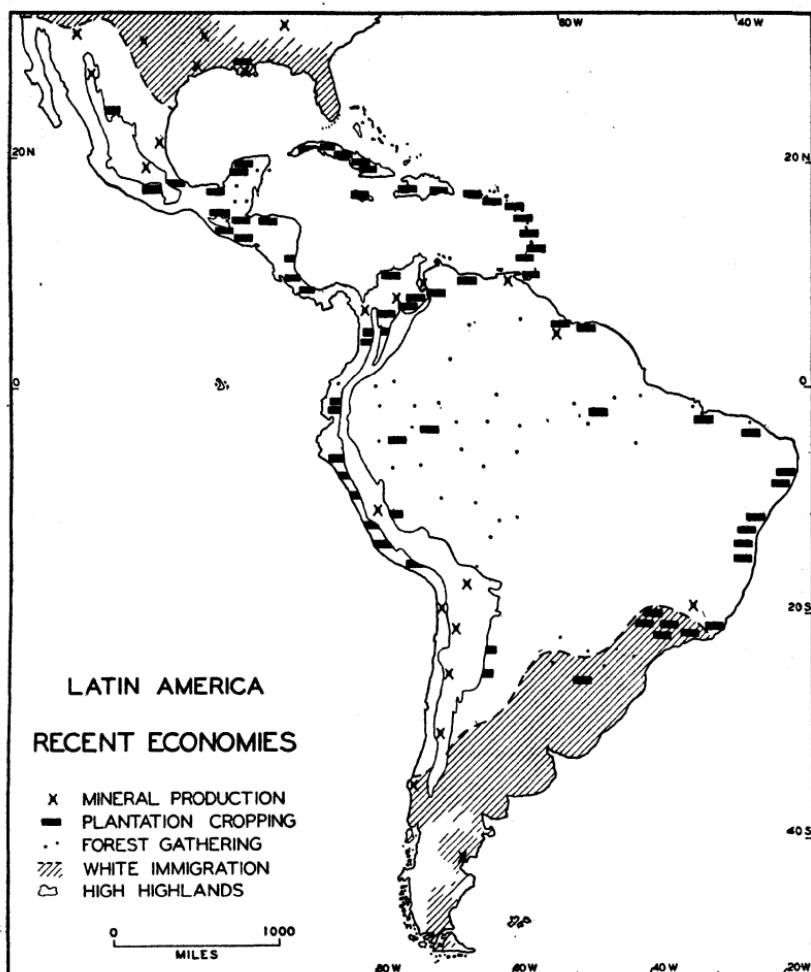


FIG. 494.—The "Recent Period" is from the time of political independence and the Industrial Revolution. Distribution of interests on the map is based on general information without quantitative data. The high highlands are shown free of modern interests, except for metal mines, mostly copper. Most of the mineral symbols outside of high highlands are for petroleum (and another should be added on the northern coast of Peru). Those that are not for petroleum are for copper in northern Mexico, bauxite in Guiana, gold and platinum in western Colombia, nitrate in North Chile, coal in South Chile, gold and iron in Brazil, and iron and coal in the Appalachian Mountains of the United States.

environmental determinism is not assumed. On the contrary, it is assumed that the only active cause of culture is culture, and not environment.<sup>1</sup>

The divisions on the map (Fig. 491) are not a framework of absolute climatic types that have caused cultural differences but represent contingent climatic types that have been devised as a result of cultural differences. This statement is as true of the earlier climatic map (Fig. 4, page 12) as of the derivative habitat map (Fig. 491). Climate is an objective fact. But *types* of climate are expressions of cultural distinctions. If other kinds of culture had dominated the earth, using items now neglected in our environment, presumably quite different divisions of climate would be mapped. Instead of coffee groves and grasslands as type indicators, climatic distinctions might emphasize anthills and moss lands, for example.

The foregoing comment does not mean that cultural types and environmental types coincide. At many points, their areas fail to coincide. However, there is normally a rough correspondence, for culture is passively conditioned by environment, first in the locality where it originates and then over areas where it succeeds in spreading. So, underlying the map divisions in theory, and overlying them approximately in distribution, are cultural features humanly invented and socially spread.

The choice of six habitat types is necessarily an arbitrary one. More or fewer types could be selected in the boundless array of environmental and cultural variety. But fortunately the combinations and major points in Latin-American environment and history seem to justify the choice as a reasonable one.

For interpretation of the present pattern, it is advantageous to consider diversities of culture in Latin America at three periods of time. In the Pre-Columbian Period, these were marked by diversities in economy, attached to particular items of environment for which certain climatic values happen to be critical (Fig. 492). In the Colonial Period, there were new economies superimposed on the Pre-Columbian and in part supplanting them (Fig. 493). The Colonial economies were not literally brought from overseas, but they developed from the European impulse. In the Recent Period, there have been new impulses from the North Atlantic and new economies superimposed on the Colonial and in part supplanting them (Fig. 494).

Each of the three periods is filled with complex variety worthy of analytical study, but the mere mention of each must serve here to introduce the following generalizations covering the present pattern of habitats one by one.

<sup>1</sup> The word "culture" in this volume refers broadly to the accumulated stock of man-made objects and ideas, as distinguished from the resources and environment of external nature.

## High Highlands

For a place of simple beginnings look first at high highlands, the zone of frost in low latitudes (Fig. 491). Areas of smooth fertile land in the *tierra fría* have provided a basis for populous agricultural districts in nine Latin-American countries<sup>1</sup>; and, in at least four of these, the core regions and national capitals are in the same area.<sup>2</sup>

**OCCUPANCE.** Conspicuous areas of good land are in spots of immature soils, of recent volcanic or alluvial origin. Here sedentary communities developed in pre-Columbian times to relatively high stages of organization and still survive, with modifications that are slight as compared with post-Columbian changes in other areas (Figs. 492 and 494). The population is predominantly Indian; agriculture is carried on by hand labor with simple equipment, to produce food for local consumption. Most of the crops are cereals and roots maturing in a season limited by frost, particularly corn in lower parts of the zone and potatoes in higher parts; most of the crop land is divided into small fields or groups of fields, each used by one family; most producers subsist on their products, and exchange a surplus locally for lesser supplies.<sup>3</sup>

Modifications since the European discovery of America include the addition of new plants, animals, people, and systems of land tenure—most of them in the Colonial Period. Wheat and barley are planted, instead of inferior indigenous small grains, particularly at altitudes above the range of corn. Sheep, cattle, and donkeys graze on uncultivable grasslands within the zone of occasional frost and above in the zone of chronic frost (Fig. 493),<sup>4</sup> meeting needs previously met less well by alpacas and llamas in the Central Andes and hardly at all by animals in Caribbean America. White people established early in the Spanish regime remain relatively few in numbers but strong in influence.

Lands are organized prevalently under Spanish systems of tenure. Large areas containing the supporting fields of many families were granted to individuals by central authority and are inherited as private property. Also large areas were acquired and some are still held by the church. Where farm lands are poor and scattered, such superimposed property rights prove nominal and leave aboriginal occupancy unaffected. But where productive possibilities promise returns above the subsistence needs of the workers, large properties are organized to serve the owners. In some places, the inhabitants continue to till their aboriginal fields and to contribute to the owners from their surplus. In other places, attractive

<sup>1</sup> There are high highlands in Mexico, Guatemala, Venezuela, Colombia, Ecuador, Peru, Bolivia, and on a small scale in northeastern Chile and northwestern Argentina.

<sup>2</sup> National capitals in high highlands are Mexico City, Bogotá (Colombia), Quito (Ecuador), and La Paz (Bolivia). In addition, much of the core region of Guatemala is in this area, and Guatemala City is near the lower margin.

<sup>3</sup> Field studies 1, Chap. II; 2, Chap. III; 7, Chap. VI; 1 and 17, Chap. VII.

<sup>4</sup> Field studies 7, Chap. VI; 1 and 6, Chap. VII.

TABLE II.—FIELD STUDIES CLASSIFIED BY LAND-USE INTENSITY AND SIZE\*

Acre	Forest occupancy (in tropical rainy lands)	Grazing occupancy (in very high highlands, semiarid, an seasonally rainy savanna lands)	Extensive commercial agricultur (in humid middle latitudes)	Intensive supply agriculture (in high highlands, desert, and tropical rainy lands)	Intensive commercial agricultur (in desert, low highlands, and tropical rainy lands)	
1,000,000±	VII. 12. Sepa X. 10. Tapajós 12. Jatobá 13. Perpetuo Socorro	III. 5. Constantina IV. 1. Old Mariel V. 4. Nuevo Mundo VI. 6. Chichasurí	VIII. 6. Pirovano estancia VIII. 7. Cabo Corrientes, Chapadmalal IX. 12. Uruguay	II. 2. Jalapa VI. 8. Carmen 10(d). Trejo Hatico VII. 2. Cali Cali X. 11(e). Bas Fortuna	II. 4. Tlahualilo 7. Chich III. 4. Maya IV. 1. Martiniq V. 1. Ennare, Hope VI. 3. Ybarra 11. Victoria VII. 3. San Miguel 4. Rímac, Chillón 9. Andahamba 15(e). Pauroto 16. Chimboote X. 1. Chapadio 2(c). Miranda 5. Boa Santesca	
1,000±	III. 6. Calzada Larga VII. 11. Aguarrunas 18. Nanay, Itaya	IV. 1. Old Mariel V. 4. Nuevo Mundo VI. 6. Chichasurí	VIII. 6. Old Pirovano 10. Choque Choe X. 4(o). Arenio 8. Marajó	VII. 9(c). San José VII. 7. San Gerónimo 8(a). Pachacuté	III. 3. Miridores VI. 5. Pastora 7(a). Trapiche 7(b). del Rio 8(b). Aguilán VII. 10. Salupude 13(b). Catuide VIII. 1. Conchali X. 9(b). Pollan 6. São João	
100±			VII. 6(a). La Reforma	II. 6. Mejía VIII. 3. Janquihue 6. Proyecto Fáceas 8. Zavalla, Roldán 10. Choque Choe Island X. 7(o). Carnaubá 11(a). Castanhal	II. 1. Magdalena Atlapac III. 2. Sactep-quez IV. 6. Curayao VI. 9(g). Sánchez 10(a). Dagua VII. 1. Chimborazo 17. Alto X. 9. Santa Rosa 11(b). Cordero	IV. 1. Mariel Coloma 2. Iaguate 3. Petion Ville 7. Bernunda VI. 10(j). Quimays 10(c). Nicacio VII. 6. Sotillo 12. Sepa Piroz VIII. 5. Aspas 9. Scarsi 11. Purvillon IX. 13. Iastí X. 4(h). Clock 5(c). Munzeas

\* The Table is not a perfect frame for reality; there are some ambiguous cases and some exceptions in habitat grouping. In general, single-family enterprises are on the lower fringe of each column, and latifundia at the top; ill-defined units are at the left and sharply divided units at the right; economies of the past are at the left and those of the modern world at the right. The greater number of studies in the "intensive commercial" column is due to greater advantages for reconnaissance.

for development, land and laborers are organized in new systems of production—combining small fields into large, specializing labor, mechanizing equipment, and centralizing collective processes.<sup>1</sup> Such property organization affects not only lands of long-established productivity but some areas of slight former productivity, particularly grazing lands, some within the zone of chronic frost.<sup>2</sup>

**SIZE TYPES.** Present occupancy in the high highlands includes both small and large farm units: on the one hand, primitive single-family farms of ten acres more or less, usually less; and, on the other hand, aristocratic farm units of a thousand acres more or less, criteria of Colonial latifundia, haciendas operated to provide wealth or recreation for non-resident owners (Table II, page 493). There are also some farms of intermediate size, a hundred acres more or less, "ranchos," worked by resident owners with the assistance of hired labor.<sup>3</sup> But these are not so characteristic as the smaller and the larger units and may be considered with the larger class, as belonging in the lower fringe of latifundia.

The farms in both classes, small and large, are basic economic units. As a matter of fact, in their kind of economic organization, they are not only at the bottom but also essentially at the top of the scale: each is nearly self-contained and not merely a minor unit in a larger whole, unless the political units in which they lie be considered larger wholes in an economic system. The main function of each is to provide subsistence for those occupying its land, with little or no recourse to outside areas. This is designedly so in the case of small primitive farms and incidentally so in the case of large properties.<sup>4</sup>

Secondary functions place them in larger economic units, for exchange of their surplus. Thus a cluster of small farms constitutes the trade area of a market town; and a galaxy of haciendas belongs in the trade area of a city.

Some special items of surplus go even farther to appear in world trade. But this larger setting is obscure from the viewpoint of farmers in the high highlands. The outstanding impression is that of local and self-contained economy, unable if not unwilling to join competently in a world system of commerce. The life of past centuries continues here, in pre-Columbian forms with slight Colonial modification.

**UNOCCUPIED AREAS.** Only areas favored by nature are occupied in the way described. Larger areas in the high highlands are rugged or rocky or too high and are occupied hardly at all.

High highlands extend beyond the low latitudes, but the middle-latitude parts are similar and need no separate classification. Large areas

<sup>1</sup> Field studies 2, Chap. II; 8, Chap. VI; 2, Chap. VII.

<sup>2</sup> Field study 6, Chap. VII.

<sup>3</sup> Field study 7, Chap. VII.

are unoccupied agriculturally; small favorable districts are occupied by sedentary subsistence communities.<sup>1</sup>

### Dry Lands

From high highlands it is a simple step down to dry low highlands and lowlands, either desert or semiarid (Fig. 491). The easy subordination of plant life, the living conditions for human life, and the problem of production are not very different from those above. Eight Latin-American countries have considerable areas of dry land,<sup>2</sup> and in one or two of these the core region and national capital are in the same area.<sup>3</sup> Dry lands extend beyond lower latitudes, with conditions of occupancy so similar in middle-latitude parts that separate description is unnecessary.

**OCCUPANCE.** In pre-Columbian times, sedentary occupancy spread alike over high highlands and dry lands near by (Fig. 492). In some localities, dry-lowland types of culture reached a stage no less advanced than high-highland types.

A primary limitation on productivity is set by scanty rainfall. Where this limitation is removed by water supply from sources other than local precipitation, dry lands have advantages. Water is commonly accompanied by areas of smooth fertile alluvial land. The climate provides for human health and comfort and year-round crop growth. It is not surprising that aboriginal farming flourished in the tropical desert and that now aboriginal economy, at least in dry coastal lowlands, has been obliterated by modern commercial economy reaching in from overseas and developing commercialized production. For such a change easy access and growth of tropical specialties, like sugar cane and cotton, provide incentives immeasurably greater than in the case of high highlands (Fig. 494).<sup>4</sup>

In less arid parts of dry lands, irrigation has not been required either for aboriginal or for commercial farming. Some crops, both subsistence and commercial, corn and henequen, for example, may be watered enough in the short rainy season of a semiarid climate, without loss of other advantages—health, uninterrupted warmth, and freedom from rank vegetation.<sup>5</sup> Corn, as a mainstay of primitive subsistence farming, is

<sup>1</sup> The Pueblo Indian district of New Mexico belongs in the category of high-highland communities beyond the low latitudes. The high-highland environment extends down to lower altitudes in middle than in low latitudes, though not so shown on the habitat map (Fig. 491).

<sup>2</sup> There are considerable areas of dry land in Mexico, Venezuela, Colombia, Peru, Bolivia, Chile, Argentina, and Brazil, and small areas, not indicated on the small scale map, in the West Indies and elsewhere.

<sup>3</sup> Lima (Peru) is a capital in a dry-land area. Santiago (Chile) is a marginal case, in a subhumid subtropical area.

<sup>4</sup> Field studies 4; Chap. II; 4, Chap. VII; and 6, Chap. X. Note also field studies 1 and 11 in Chap. VIII.

<sup>5</sup> Field study 7, Chap. II.

appropriate to seasonal moisture limited by drought in dry lands, as well as to warmth limited by frost in high highlands. Grazing also, in the grass and bush growth of semiaridity, has been added since pre-Columbian times for both subsistence and commercial purposes (Fig. 493).<sup>1</sup>

**SIZE TYPES.** Farm units fit into the same scale of sizes already indicated: (1) one-family farms of the 10-acre category; (2) middle-class farms of the 100-acre class, employing hired help; and (3) aristocratic properties of the 1,000-acre class (Table II, page 493). In contrast with high highlands, here are opportunities both for subsistence and for commercial production, on a small as well as on a large scale.<sup>2</sup>

Control of water for lowland irrigation is commonly better adapted to large- than to small-scale organization. Moreover, cardinal crops of dry lowlands, particularly sugar and henequen, are not now produced for export by small uncoordinated farm units in successful competition with large establishments. Specific processing requirements have allowed large-scale mechanical equipment, fed by gang labor and rail transport, to assume unqualified superiority. Under these conditions, small farms give way to large, and the old Colonial aristocracy of inherited latifundia gives way to the recent foreign aristocracy of capitalism.

At the same time, enterprise is not compelled to proceed into still larger forms of international organization, to combine production with overseas transportation and foreign marketing. The chief products are such as can be stored, transported, and marketed at leisure and are so widely obtained or obtainable in the world as to be not easily subject to monopoly.

Thus the dry lowlands contain large strong farm units, connected loosely with world financial structure through foreign capital investment, but otherwise not closely integrated with overseas economic organization.

In semiarid grazing areas, less intensive production allows for more land per capita. Single-family livestock ranches are in the 100-acre class; and middle-class ranches of no aristocratic pretensions are in the 1,000-acre class.<sup>3</sup>

Occupance in dry lands is characteristically distributed in spots of intensive productivity and in semiarid tracts of extensive productivity and is almost lacking in great outlying and intervening areas of practically no productivity.

### Humid Low Highlands in Low Latitudes

The transition to humid low highlands from either high highlands or dry lands is a distinct change for human occupance, though it may

<sup>1</sup> Field studies 6a, Chap. VI; 10, Chap. VIII.

<sup>2</sup> Field studies 5 and 6, Chap. II; 8b, Chap. VII; 5, Chap. VIII.

<sup>3</sup> Field study 10, Chap. VIII.

be a short distance in miles (Fig. 491)—a change from frost or drought to both warmth and moisture. Areas of humid low highlands, broadly defined, appear in 16 Latin-American countries and several colonies.<sup>1</sup> Every highland worth the name in low latitudes rises to heights within this zone. As in the preceding discussion of occupancy in high highlands and dry lands, attention here is directed to characteristic and relatively favorable occupied areas.

**OCCUPANCE.** Below every area of *tierra fría*, on one or both sides, are lower slopes of *tierra templada*. These are relatively narrow or inconspicuous in some places, as below the plateaus in Mexico, Ecuador, and Peru, and relatively prominent in others, as in Guatemala, Venezuela, Colombia, and Bolivia. Such low-highland areas are described sometimes, in pleasant contrast to both bleak heights above and hot plains below, as lands of perpetual spring, never too cold or too hot for comfort, combining the advantages of agreeable living conditions and prolific plant growth, including both seasonal food crops and tropical perennials. Among the tropical specialty crops are not only those which grow as well or better in hot lowlands, such as sugar cane and bananas, but also one at least which grows better in mild warmth than anywhere else, coffee.

But the low highlands are not without drawbacks. Tropical disease, as well as tropical vegetation, extends up through the warm zone, and human health conditions are not in all cases better than in hot lowlands. On rainy slopes, farmers face problems of tropical forest growth hardly less dense and luxuriant than that of lowlands.

The great pre-Columbian highland cultures arose above the line of frost. Highland Indian farmers have continued to avoid forested lower slopes, and the *tierra templada* is a marginal zone of aboriginal occupancy (Fig. 492). Some districts of the warm highlands have a worse reputation for pestilence than outlying hot lowlands—a reputation due to sad experience on the part of inhabitants of a cool plateau, ignorant of hot lowlands but familiar with a warm malarial coffee district near by where they have been employed as laborers.

Some low plateaus and valleys, sheltered by mountain ranges from excessive rainfall, are less subject than windward slopes to disease and forest growth, an advantage of topographic exposure rather than altitude.

All in all, the relative advantages of *tierra fría* and *tierra templada*, for occupancy, so nearly balance that the scale may be tipped either way. For aboriginal subsistence farming the balance is in favor of *tierra fría*. Modern commercial production has tipped the scale in favor of

<sup>1</sup> There are humid-low-highlands-in-low-latitudes in all the Latin-American countries except the southernmost four (Chile, Argentina, Uruguay, and Paraguay). The capitals of four Central American countries and of Venezuela are in low highlands: Guatemala City, San Salvador (El Salvador), Tegucigalpa (Honduras), San José (Costa Rica), and Caracas (Venezuela).

*tierra templada*. Landowners and Indians have come down or been pushed down from high to low highlands; and overseas traders and immigrants have pushed their way up. Thus, lower slopes close to high plateau communities, as in Guatemala and Colombia, have been occupied largely or partly from above<sup>1</sup>; and low highlands far from higher communities have been occupied from abroad. Among detached highlands, the low central plateau of Costa Rica, occupied by white farmers, has won a reputation as the most progressive community in Central America<sup>2</sup>; low highlands of the West Indies have well-established coffee districts<sup>3</sup>; and the low central plateau of Brazil, occupied by settlers of European and African blood, has become the productive center of the largest country of Latin America (Fig. 494).<sup>4</sup>

Only low highlands near high-highland communities are known specifically as *tierra templada*, a phrase applied in immediate contrast with higher and lower areas. Outlying parts of the Brazilian highlands and all the Guiana highlands are relatively uninviting unoccupied areas. In this review of present occupancy, such unoccupied low highlands have a neutral relation to the occupied areas, similar to the relation of unoccupied mountains and deserts to high-highland and dry-land communities in the preceding discussion.

**SIZE TYPES.** Low-highland farms fit into the same categories of size as those in dry lands—small, medium, and large—with connotations of family work, middle-class residence, and aristocratic control, respectively (Table II, page 493). Here, also, farms provide subsistence to their inhabitants, but not as the prime objective. Their very existence reflects a demand of commercialized middle-latitudes for commodities not obtainable at home. This demand does not embrace seasonal crops of inaccessible high highlands, but it does embrace tropical crops acquired nowhere so well as in low highlands. Coffee is the standard case of a crop limited practically to the low-highland zone.

Accordingly, farms of the low highlands are linked to Europe and North America in larger units of world economy. Yet the links are loose. Among the products, coffee, at least, can be produced as well on a small scale as on a large—by a farm family as well as by organized gang labor, by hand tools as well as by machinery; it can be stored easily and transported slowly in small quantities by pack animals, as well as rapidly on a large scale by modern means. Therefore, coffee for world markets is produced on small primitive isolated farms as well as on large modern plantations. Incentives are slight for vigorous expansion and modernization of plantations, for integration of producing units with transportation

<sup>1</sup> Field studies 8, Chap. III; 7, 9, and 10, Chap. VI; 9 and 10, Chap. VII.

<sup>2</sup> Field study 1, Chap. III.

<sup>3</sup> Field studies 3 and 4b, Chap. IV.

<sup>4</sup> Field studies 1 and 2, Chap. X.

systems, and for direct control, from foreign marketing headquarters, of *tierra templada* properties as outlying members of a major economic organization.

Easy competition among producers is related to low returns, at least in some districts; and consequent dearth of local capital invites one form of foreign control, through financial advances—an extended form of organization, but on a petty rather than on a grand scale. Dispersed production and divided control discourage large-scale organization for monopoly, although hopes to the contrary have figured in Brazilian national economic planning.

There is some advantage in processing the crop on a scale larger than that of minimum facilities in a small farm—for better equipment, standardization, and marketing. Accordingly, in common practice, a central trading establishment serves the small plantations of a district. Thus, small basic units grouped together form a larger economic whole. Yet, in general, farms of the low highlands are not closely consolidated in greater regional and world economic units.

### Seasonally Rainy Lowlands in Low Latitudes

The transition to rainy lowlands from low highlands is almost imperceptible. It is a further step away from salubrious air and simple sedentary occupancy, but toward potentially richer productivity (Fig. 491). Seventeen of the countries and all the island colonies have areas of seasonally rainy lowland.<sup>1</sup>

**OCCUPANCE.** Occupance has proceeded with less momentum from indigenous subsistence culture and more initiative from the commercial world. Here is a lack of good aboriginal labor and an excess of potentially productive land, as compared with more labor and less land in high and dry lands. When discovered by Europeans, the rainy lowlands were populated by relatively few Indians and those few were unaccustomed to sedentary agriculture (Fig. 492). Local labor vanished without adaptation to sedentary conditions, and highland Indian labor was unadapted to lowland conditions. The problem was solved by Negro slave plantations (Fig. 493). These were unknown in Europe and yet were a European invention, to surmount the difficulty of providing proper labor under proper management in a place having, at the outset, neither labor nor management and yet having peculiar productive capacity.

<sup>1</sup> There are seasonally-rainy-lowlands-in-low-latitudes in all the Latin American countries except the southernmost three (Chile, Argentina, and Uruguay). The capitals of five countries in Central America and the West Indies are in seasonally rainy lowlands: Managua (Nicaragua), Panamá City, Habana (Cuba), Port-au-Prince (Haiti), and Ciudad Trujillo (Dominican Republic). Asunción (Paraguay) is a marginal case, nearly middle latitude.

Formal slavery has been abolished, but no good substitute has developed to replace essential elements of the old system: local specialized production by exotic mobilized labor and management—labor physically strong but otherwise weak, and management economically and technically strong (Fig. 494).

In seasonally rainy lowlands, sugar was the most conspicuous object of foreign demand at the outset and is still so. Cane produces well in a climate of prolonged rainfall and shorter drought in periodic succession. Sugar peopled the West Indies and Northeast Brazil, areas thereupon rising to maximum population density; and sugar today accounts for the greatest foreign investment in and export from seasonally rainy lowland regions. Commercial sugar production is a large-scale industry, involving plantations large in themselves or well-integrated in a large organization.<sup>1</sup>

Some other products lend themselves to small-scale production. Cotton, regularly ginned and baled for shipment to world markets, is a case for which there need not be such close integration between farm production and the gin process as there is between cane growing and sugar milling. Therefore cotton, like coffee, is grown in small as well as in large plantations.<sup>2</sup> Subsistence farming is included also on a small scale, as a supplement of commercial production and as a last resort where commerce fails.<sup>3</sup>

Included within seasonally rainy lowlands, mainly on the drier margin, are extensive tropical savannas. In the Colonial Period, these were selected even earlier than plantation sites for usage no less strange than plantations—new and strange in comparison with previous occupancy in the same areas—namely, for livestock grazing (Fig. 493). Cattle, unlike sugar, raised no difficult problems of labor and management, to require the invention of a system unknown in Europe. Tropical cattle ranches, as well as sugar plantations, have continued to the present time at much the same tempo of production.<sup>4</sup> But the ranches have undergone less internal organization and have lost inordinately in relative economic importance. Tropical plantations are still the best source of sugar, but tropical ranches are not the best source of cattle.

**SIZE TYPES.** The three chosen classes of farm size all exist in the seasonally rainy lowlands, although they are not all represented in these studies (Table II, page 493). In general, it may be said that great agricultural properties, thousands of acres in extent, represent recent capitalistic control rather than Colonial latifundia; that small properties represent component or attendant or residual bits of commercial organization;

<sup>1</sup> Field studies 1 and 4b, Chap. IV.

<sup>2</sup> Field studies 2, Chap. IV; 18, Chap. IX. Sugar for local markets also is produced on a small scale by simple methods (field study 7, Chap. VI).

<sup>3</sup> Field study 6, Chap. IV.

<sup>4</sup> Field studies 5, Chap. III; 4, Chap. VI; 4a and 8, Chap. X.

and that great grazing properties represent surviving Colonial latifundia, not now aristocratic and merely surviving because of external disregard rather than because of internal strength. Extensive areas of grassland and forest in seasonally rainy lowlands are at present almost unused and probably almost useless.

### Chronically Rainy Lowlands in Low Latitudes

Chronically rainy lowlands are at an opposite extreme from high highlands for occupancy within the tropics. The extreme is not necessarily one of distance (Fig. 491). Twelve of the countries and all four of the mainland colonies of Latin America have appreciable and characteristic areas of this habitat.<sup>1</sup>

None of the countries has its core region in chronically rainy lowlands, and there are no national capitals in such areas.<sup>2</sup> On the other hand, all four of the colonies have their principal districts and capitals in chronically rainy lowlands. In this respect, the colonies are like outlying regions of the countries, which have provincial capitals in their outlying rainy lowlands.

**OCCUPANCE.** It is in their characteristics for occupancy that these lowlands are extreme. They show the least effect of near-by sedentary subsistence communities and arouse the greatest foreign interest in peculiar specialties obtainable nowhere else. Here is the maximum contrast between local primitive occupancy and modern world organization. Here primitive occupancy is passive and close to nature, unable to convert the habitat, surviving by submission;<sup>3</sup> coincidentally, modern organization requires all the cunning developed in other regions to dominate the area. Traces of advanced pre-Columbian culture in rainy lowlands of Central America afford a perplexing mystery.<sup>4</sup> There and elsewhere, modern enterprise, tempted but timid, has gained only local control and beyond that has only reached in warily to touch hands with primitive occupancy.

Yet, in this environment, types of occupancy are comparable with those of other habitats. Primitive subsistence farming exists and is

<sup>1</sup> There are chronically-rainy-lowlands-in-low-latitudes in Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, Panamá, Venezuela, Colombia, Ecuador, Peru, Bolivia, and Brazil, and small areas, not indicated on the small-scale map, in the West Indies. The mainland colonies are British Honduras, British Guiana, Surinam, and French Guiana.

Nowhere is rainfall evenly distributed through every season. In almost all rainy regions, people speak of a "dry season," referring to whichever period is least rainy. The category "chronically rainy" (as distinguished from "seasonally rainy") includes those areas where the least rainy season is still humid enough so that forests stay green and crop growth continues.

<sup>2</sup> Rio de Janeiro (Brazil) has been cited sometimes as a capital in chronically rainy lowlands and is within such an area on the generalized habitat map (Fig. 491). But the climate of the city is better classified as seasonally rainy lowland.

<sup>3</sup> Field study 11, Chap. VII.

<sup>4</sup> Field study 4, Chap. III.

appropriately modified by contact with the outside world.<sup>1</sup> The system may be considered no less stable than sedentary subsistence in high highlands, even though using land in rotation through a period of years instead of in set fields and using habitations fixed for less than generations. Some of the same crops appear, particularly corn; and different crops play similar roles—cassava for potato.

Landlords and Indians of high highlands, who stayed aloft during the Colonial Period, have in some places come down or been pushed down during the recent commercial period into rainy lowlands as well as into low highlands.<sup>2</sup> Where low highlands are narrow, near-by rainy lowlands are a less inviting though acceptable alternative. Thus, coastal lowlands of Ecuador were developed appropriately as the world's first great cacao district.

In other areas, settlers from overseas have occupied wet lowlands, as they have dry lands and low highlands.<sup>3</sup> But because laboring conditions are relatively uninviting, immigrants come only under unusual pressure to leave an old home and accept a new or when readjustment from a similar old home need be only slight. They include Negroes, East Indians, French convicts, and Confederate planters. Negroes, whose ancestors were brought from Africa to the West Indies and the Northeast of Brazil, now are moved into Central America<sup>4</sup> and the Tropical East Coast of Brazil,<sup>5</sup> as if the slave-plantation stage in seasonally rainy lowlands were a way station enroute to banana and cacao plantations in chronically rainy lowlands (Figs. 493 and 494).

**SIZE TYPES.** The contrasted farm types of the rainy lowlands display extreme differences of size (Table II, p. 493). Single-family farms are numerous, widespread, and generally smaller than 10 acres, circumscribed by growing forest. Though mainly for subsistence, some participate in commerce. Cacao, like coffee, can be produced satisfactorily on a small scale with simple equipment and pack-trail transportation.

Middle-class farms of 100 acres improved are included<sup>6</sup> and are not uncommon, particularly near highlands in places where alternative opportunities for settlement are lacking. In such areas, serving as a substitute for low highlands and less rainy lowlands, even coffee, cotton, and sugar can be and are produced commercially, for lack of more appropriate environments in the vicinity.<sup>7</sup>

<sup>1</sup> Field studies 9 and 11b, Chap. X.

<sup>2</sup> Field studies 11, Chap. VI; 8 and 16, Chap. VII.

<sup>3</sup> Field study 1, Chap. V.

<sup>4</sup> Field studies 1 and 4, Chap. III.

<sup>5</sup> Field studies 5a and b, Chap. X.

<sup>6</sup> Field studies 5, Chap. VI; 15a and b and 16, Chap. VII; 11c, Chap. X. Though containing only 100 acres improved, in some cases the property includes 1,000 acres or more unused, illustrating the same point as that made with reference to concessions of millions of acres on p. 503.

<sup>7</sup> Field study 15b, Chap. VII.

Farms of extremely large size are numerous, conspicuous, and commonly far larger than a thousand acres. They include land holdings of the old Colonial aristocracy, of the recent trading aristocracy, and, above all, of foreign capitalistic organization. The old Colonial aristocracy is represented mainly in the few places near highlands where landlords have pushed their way down. But already these have declined in competition with outsiders and show even less vigor than the smaller enterprises of middle-class settlers.

The recent trading aristocracy is well-represented in cacao districts. In spite of the theoretical advantages of small-scale cacao production, local trade organization is primitive, cooperation is slight, and small producers are weak—more so than in coffee districts. Consequently, there are strong incentives for foreign commercial interests to close the wide gap between producers and traders by direct large-scale control of production.

In other cases, the advantages of large-scale foreign control are more compelling. Bananas for a world market require production not merely coordinated but highly synchronized, with rapid large-scale transportation on land and overseas and to the ultimate consumer.<sup>1</sup> No halfway measures serve the purpose. Here is a system of plantations, hewn from selva in slightly occupied rainy lowlands, strategically distributed, designed in general to supply the whole market and in particular to furnish cargo fully and regularly to special liners of an ocean fleet. Moreover, these plantations are integral parts of a world economic organization overleaping national boundaries in production as well as in trade, thereby illustrating the unconforming relations of countries and natural regions.

The banana business was in a sense full-grown at the start, although less perfected and extended than now. There has even been a tendency opposite to that of amalgamation as observed in cacao production: in this case, where initial full control provides complete coordination, later established routine permits central authority to relax and surrender peripheral responsibility to local enterprise and small-scale cooperation.

Other instances of interregional international organization appear under different but comparable circumstances, for example, the Ford rubber plantations.<sup>2</sup> As farm properties, such units in chronically rainy lowlands reach extremes of size and organization hardly found in other habitats.

In addition, there are other property units, concessions of millions of acres,<sup>3</sup> unsurpassed in mere size, but slightly organized and reflecting

<sup>1</sup> Field study 4, Chap. III.

<sup>2</sup> Field study 10, Chap. X.

<sup>3</sup> Field studies 12, Chap. VII; 12, Chap. X.

only the fact that, in this extensive habitat, the possibilities far exceed the actualities of occupancy—and that spots now occupied are few and far between, in an environment which might be called "desert" with respect to its lack of population.

**POTENTIALITIES.** If and when the problems of advancing settlement are solved by the costly tools of civilization, the possibilities of production are unique and varied. But, until then, great areas fully endowed with characteristic resources will lie unused. Nature here is hardly to be controlled by independent immigrants working singlehanded. Even capitalistic enterprise has gained only limited control at high cost to win odd items here and there. Moreover, most of the odd products of cultivation, to say nothing of the scientific techniques of control, are of foreign origin, introduced from other regions.

Civilization has hardly begun to reckon upon extensive breeding of crops from the vegetation of the rainy lowlands, the richest assortment of plants in the world. The mere gathering of wild products is a relatively simple achievement (Fig. 494) accomplished at the dawn of civilization in other regions. Even the problems of peopling the rainy lowlands, either with regimented laborers or with independent farmers, is not difficult in comparison with that of developing the indigenous cultivation, on a broad base of biological improvement as a main branch of world cultivation. Such development is not an immediate prospect of the rainy lowlands, which now are only border zones of world economy.

Natural conditions in chronically rainy lowlands are not absolutely bad for occupancy, but only relatively unsuitable for the types of culture that have entered here, except the indigenous primitive culture of mobile forest people. The environment did not submit to pre-Columbian sedentary occupancy or to Colonial occupancy, nor has it submitted to modern occupancy by people from the North Atlantic. Here, as elsewhere, nature may yet be subdued by another type of culture, old or new.

### Humid Middle Latitudes

From a tropical sequence beginning in high highlands and ending in rainy lowlands the final step is into middle latitudes, a return to frost (Fig. 491). Four countries have significant areas in humid middle-latitudes, including core regions and capitals in two of the four cases.<sup>1</sup>

**OCCUPANCE.** Similarity to high highlands in frost occurrence is accompanied by similarity in certain other respects; for example, the same products appear—corn, wheat, and livestock. Yet occupancy is at an opposite extreme of development. The habitat is different from high

<sup>1</sup> There are humid middle-latitude areas in Chile, Argentina, Uruguay, and Brasil. Capitals in the same area are Buenos Aires (Argentina) and Montevideo (Uruguay). Santiago (Chile) is near the margin on the dry side. The core region of Paraguay, containing Asunción, is near the margin on the low-latitude side.

highlands and also from dry lands in a combination of circumstances, climatic and otherwise.

Aboriginal sedentary agriculture is absent, having neither developed in this setting nor spread to it (Fig. 492). Sparse and mobile Indian occupancy based on hunting is gone from grasslands and almost gone from forests. Colonial pastoral occupancy, also sparse and mobile, is remembered for its cowboys (*Gauchos*) (Fig. 493), but these also are gone, leaving only traces of their system. Europeans, particularly from Spain, in the Colonial Period, found high or dry regions more congenial and had little interest in humid pampas, probably less than in tropical savannas.

Now another economy, more vigorous than that of the *Gauchos*, has appeared. Livestock plays a new role, and so do crops. Europe has found middle latitudes of the Southern Hemisphere not only congenial but peculiarly useful (Fig. 494). Earlier commercial interests disregarded farm resources similar to those of Europe, while seeking exotic specialties not found at home. But attention shifted when northwestern Europe began to manufacture trade goods, to want more food of its own kind, and to invent new ways of farming and transporting farm products.

Elements of European farming fitted together as well in the new habitat as if they had been indigenous, without the strange problems of plants and labor that are characteristic of the tropics. European civilization was here not confined to reaching in, but easily took charge. The Colonial system of land tenure provided a convenient framework already established, for better or worse. Property ownership by aristocrats of Colonial lineage has survived and received new life in the humid pampas, while languishing in tropical savannas and high highlands and disappearing under capitalistic enterprise in tropical plantations. Local leadership holds and develops sources of production; foreign capital has been received to supply its trade connections, by railways, packing plants, and ships; European immigrants have been received as tenant labor to replace and reinforce sparse Gaucho stock. Under these circumstances, latifundian inheritance has become a bonanza.<sup>1</sup>

The farms are basic units in an economic organization greater and more complex than that of the banana trade, though not controlled from a central office. In this case, there is a vast and intricate system for producing, assembling, processing, transporting, and marketing a variety of commodities, depending on underlying local units of production and overlying world-wide commercial structures all effectively integrated.

The farming system includes democratic as well as aristocratic units of production.<sup>2</sup> Numerous *colonias* of European immigrants are es-

<sup>1</sup> Field studies 6 and 7, Chap. VIII; 12, Chap. IX.

<sup>2</sup> Field studies 6 and 8, Chap. VIII.

tablished in single-family farms. In forested South Chile and outlying northern areas of the Argentine Humid Pampas, such forms prevail.

**SIZE TYPES.** Farm sizes conform to middle-latitude ways and circumstances (Table II, p. 473). The category of 10 acres is represented only in cases of special intensity—truck farms, and orchards of the Paraná Delta.<sup>1</sup> Single-family farms, producing cereals and livestock, normally are of 100 acres or more. Farms of the largest class, 1,000 acres and generally much more, are prized possessions of the landed aristocracy.

Countries sharing humid middle-latitude regions are not more homogeneous than those within the tropics. In fact, all but Uruguay have, in addition, areas classified previously with tropical habitats, including not only low-latitude districts but also middle-latitude high-and-dry lands, of intensive irrigation, extensive grazing, or no occupancy.

Present occupancy in humid middle-latitude regions is a modern phenomenon, a far cry from primitive subsistence occupancy, either in the same area long ago, or in high highlands and other regions now.

### Mineral Industry

The great mineral industry of Latin America differs so radically from farming in the basis of its distribution that a different geographic classification is in order. Contemporary climate qualifies production hardly at all and working conditions only incidentally. Mineral resources are highly localized and unevenly scattered, and mining has developed where the most available resources have been found. Mineral production is important in at least eight of the Latin-American countries,<sup>2</sup> and there are some resources in all the others and some sorts of mineral production in every one.

TABLE III.—MINE STUDIES CLASSIFIED BY ROCK-STRUCTURE REGIONS\*

Deranged highland	Old highland	Sedimentary lowland
II. 3. San Rafael	V. 2. Mackenzie	VI. 6(b). Lagunillas
VI. 9(c). Placer gold mine	X. 3. Morro Velho	VII. 5. Talará
VII. 18. Milluni		VIII. 4. María Elena
VIII. 2. Braden		

\* Metallic concentrations in highlands; sedimentary deposits in slightly disturbed strata.

Broad types of mineral deposit (Table III) correspond in general distribution with major land forms (Fig. 3, page 11) or rock-structure regions (Fig. 7, page 15). Some metals are segregated in deranged highland structure (folded, faulted, and igneous rocks in Fig. 7,

<sup>1</sup> Field study 9, Chap. VIII.

<sup>2</sup> Mineral production is important in Mexico, Venezuela, Colombia, Peru, Bolivia, Chile, Argentina, and Brasil, in districts indicated in Fig. 404.

page 15); others, in old highland structure (ancient and massive rocks in Fig. 7, page 15); and sedimentary minerals, particularly petroleum, in lowland structure (sedimentary rocks and sediments in Fig. 7).<sup>1</sup>

**OCCUPANCE.** Metal mining in the present inherits from the past (Figs. 493 and 494). Some prehistoric mine sites are worked still by descendants of prehistoric miners. Mines of the Pre-Columbian Period were succeeded by Colonial mines, and some of these, in turn, by mines now active.

Yet the modern mineral industry is alien. Indigenous mining has declined far more than indigenous farming. Mining started locally, and some technical evolution has taken place locally even in recent times. But Colonial mining was mainly an extension of Mediterranean mining in organization and technology; and now modern mining is even more an extension of North Atlantic operations, reaching from foreign centers directly into Latin-American deposits and there applying exotic modes of procedure to local problems in elaborate detail.

From the outset, commercial mining is mostly on a larger scale of organization than single-family farms. This characteristic serves well the special need (particularly in buried and low-grade deposits) for consolidated control, unified approach, mechanization, organized extraction, centralized processing, and bulk transportation.<sup>2</sup>

Free-lance placer mining can compete on even terms with dredge and lode mining,<sup>3</sup> but not so other small-scale mining efforts. The advantages of large-scale activity are particularly evident in the recovery of industrial minerals, which have succeeded precious metals as recent products in some districts and are essentially low-grade in comparison with gold placers and primitive lodes.

The foreign complexion of mining is readily understandable: minerals are sought by foreign interests as far away as necessary to obtain them, and immediate effective extraction is impossible without the means developed elsewhere through a long period of industrial evolution. In extending their elaborate methods to Latin America, foreign operators enjoy the advantage of conditions generally similar to those in mines at home—unlike the case of tropical-plantation operators, who are faced with problems very different from those incidental to farms at home.

<sup>1</sup> The "unconsolidated sediments" of Fig. 7, p. 15, occupying the "lowlands" of Fig. 3, p. 11, are underlain commonly by consolidated sedimentary rocks. These contain the chief petroleum resources, particularly along both sides of the western highlands, highly localized within these areas.

<sup>2</sup> Field studies 8, Chap. II; 2, Chap. V; 18, Chap. VII; 2, Chap. VIII.

<sup>3</sup> Field studies 8c, Chap. VI; 8, Chap. X. The example given of placer mining (field study 9c, Chap. VI) is an old establishment on private property, and not a free-lance enterprise, but working characteristics are similar. Gold placer mining is carried on in the Rio Marañón above La Estrella (Fig. 305, p. 312) as a free-lance enterprise without even the staking of claims.

In many places, mines have also the advantage of proximity to an indigenous subsistence population as a source of satisfactory labor. There is, in fact, some regional affiliation between metallic mineral deposits and volcanic highland communities (Figs. 492, 493, and 494).

Mineral deposits in lowlands generally are not so favored with respect to labor. Petroleum fields on tropical coastal plains are like plantations in their problems of obtaining and maintaining labor. In fact, petroleum production is like such highly integrated plantation systems as that of banana production, including sudden and unusual alien occupancy, complete coordination with overseas transportation and marketing, and centralized control in an interregional international economic organization.

Contemporary oil fields, like sites chosen for banana plantations, have the advantage of coastal accessibility (Fig. 494).<sup>1</sup> Potential fields of interior lowlands await a world demand for more remote resources.<sup>2</sup> Massive deposits of metallic minerals in old highlands, lacking both coastal accessibility and indigenous local labor, and not particularly rare, are only lately being tapped to supply world markets.<sup>3</sup>

Exploitation direct from overseas is not the rule without exception. Nitrate deposits, unknown elsewhere, have been exploited by methods developed locally under local leadership and supported by direct action from abroad only recently.<sup>4</sup> Chile has led in local mining enterprise, having not only nitrates but also coal, mined for domestic markets and not required in the North Atlantic (Fig. 494).<sup>5</sup> Yet even in Chile production of industrial metals is a branch of economic organization spread overseas from the Northern Hemisphere.<sup>6</sup>

**SIZE TYPES.** It is a far cry from international industrialized mining enterprises to the simple digging of common minerals for local use. In fact, it is so far removed that the latter is included here only to complete the formal classification and indicate where minor items belong under the general heading of mineral economy.

In mining, there are traces of the same classes as those observed in farming, from small-scale indigenous subsistence production to large-scale foreign commercial production. But whereas large population groups are organized for and devoted to farming of the simple indigenous sort,

<sup>1</sup> Of the places marked with the symbol for mineral production in Figure 494, nine are petroleum areas, all in coastal lowlands—in Mexico, eastern Venezuela (and Trinidad, Fig. 101, p. 121), western Venezuela, Colombia, Argentina, and four in the United States. A tenth, in the Peruvian coastal lowlands, should be added. See field studies 6b, Chap. VI, and 5, Chap. VII.

<sup>2</sup> On the eastern side of the Andes in low latitudes.

<sup>3</sup> Iron ore in Minas Geraes, Brazil, for example.

<sup>4</sup> Field study 4, Chap. VIII.

<sup>5</sup> Nitrates in North Chile and coal in the Near South, represented by symbols in Fig. 494.

<sup>6</sup> Field study 2, Chap. VIII.

the same groups engage in mineral production only as a minor interest, to supply common needs in connection with farm living. Thus clay is dug and used on the spot to house farm families in the high highlands and dry lands, from Mexico to Argentina, and for tenant farmhouses in the Humid Pampas.<sup>1</sup> More specialized but still on a small scale is the use of clay in making domestic pottery for local trade in small markets, not only in high highlands and dry lands but also in Indian communities of tropical forest lands.<sup>2</sup>

On a moderate scale of local specialization are the production of tile, brick, and building stone, marked by cultural differences—pre-Columbian, Colonial, and Recent.<sup>3</sup>

On a large scale, with recent foreign techniques in most cases, but still for a domestic market, are the making of glass and cement<sup>4</sup> and the mining of salt and coal. For *reductio ad absurdum* in classification, ice and bottled water may be included with the large-scale group.

Thus the series (from small- to large-scale production of common minerals for local supply) is completed up to the great mineral industries exploiting uncommon resources for world use, which have been discussed previously. The series is like that of farming, from subsistence corn to export bananas and beef.

In this reconnaissance the small widespread production of common minerals, differing little from region to region, seems not to call for further analysis. Geographically, the mineral industry is essentially that of the great commercial resources.

Mines are not to be classified according to areal size of basic units as in the case of farms. Mineral concentration, providing wealth and work for many men during many years, in small irregular unexpected places, raises unforeseen problems of land tenure. A system of allotment for farm purposes, used for mining in default of other provisions, is a cause of inconsistent regulation and of potential upset. Mineral resources, more than any others, are involved in the current instability of the established order. Latin-American mining is part of a world economy, with its center in North Atlantic countries and its outlying parts located wherever deposits happen to be found, under the arbitrary supervision of transitory local authority.

### Minor Economic Interests

Forest gathering, fishing, and hunting need only be put in their places with reference to the present study. They fit into the same habitat types

<sup>1</sup> Field studies 1, Chap. II; 6, Chap. VIII.

<sup>2</sup> Field studies 1, Chap. II; 15b, Chap. VII.

<sup>3</sup> Field studies 1 and 7, Chap. II; 3 and 4, Chap. III; 7, Chap. IV; 4, Chap. VI.

<sup>4</sup> Field study 1, Chap. IV.

as farming and in fact have been covered, at least by implication, in the discussion of farms. They accompany and parallel farm economy and to a less extent, also, mineral economy, in a similar series from small-scale indigenous subsistence to large-scale foreign production of peculiar specialties.

**FOREST USE.** On farms at the small subsistence end of the series, forest materials supplement common mineral materials. Thus, for building purposes, palm thatch and wood are used in tropical rainy lands, as are clay and stone in highlands and dry lands.<sup>1</sup> At the commercial end of the series are forest establishments producing specialties for world commerce, such as mahogany.<sup>2</sup>

In general, gathering forest specialties is on a smaller scale than plantation farming, and in local rather than in foreign hands (Fig. 494). Indeed, by nature it is preliminary to plantation farming in phases of tropical production not intensely organized under foreign control. A change from wild-plant gathering into crop farming awaits prospective scarcity or undue cost of wild supply. For some commodities, such as tagua nuts and divi-divi, no shortage is in prospect;<sup>3</sup> for others, such as mate and rubber, transition is in progress.<sup>4</sup>

**HUNTING** is related to gathering and yields both supplementary subsistence for incidental food and specialties such as peccary skins, for commerce.<sup>5</sup>

**FISHING** is more distinct from other pursuits. In communities depending on subsistence production, water bodies are accepted along with farm and forest lands as a useful part of the supporting area. But even in such places fishermen are likely to be specialists.

In general, fishing is widespread, in rivers, lakes, and coastal waters, and is organized on a small scale, to supply local markets. It is characteristic in places of simple and watery attachment to nature, as in forested lowlands,<sup>6</sup> and is not absent even in high highlands—in Lake Titicaca, for example. It is active along water fronts in regions of abundant labor, such as Northeast Brazil and the West Indies.<sup>7</sup>

<sup>1</sup> Field studies 1, Chap. IV; 11, Chap. VII. Wood for fuel is in the same class (field studies 1 and 2, Chap. II; 9, Chap. VIII; 9 and 11b, Chap. X).

<sup>2</sup> Field study 6, Chap. III. The mahogany example (field study 6, Chap. III) happens to be for a domestic market. There is also other production on a scale larger than subsistence farming, for domestic markets (field studies 3, Chap. VIII; 2, 4a, 10, 12, and 13, Chap. X).

<sup>3</sup> Field study 13b, Chap. VII. Field study 6a, Chap. VI. Field studies 4, Chap. VI; 7a, Chap. X.

<sup>4</sup> Field study 4b, Chap. X. Field studies 13a, Chap. VII; 10, 12, and 13, Chap. X. Fig. 13, Chap. II.

<sup>5</sup> Field study 13a, Chap. VII. Related also to other interests in some cases (field study 6, Chap. VII).

<sup>6</sup> Field studies 6a and 11, Chap. VI; 11 and 12, Chap. VII; 11d, 12, and 13, Chap. X.

<sup>7</sup> Field studies 7b, Chap. X; 7, Chap. IV.

Because fishing establishments are merely landward termini of activities spreading over water areas, they are commonly concentrated at convenient points, particularly at ports, thus taking advantage of the same starting point for their particular waters as that used by commercial ships and of the same access to land markets. Fish are marketed fresh at innumerable landing points, carried on ice in a few cases for near-by urban markets,<sup>1</sup> and dried under favorable circumstances for transportation from outlying areas.<sup>2</sup>

Peculiar specialties for world markets also are represented among fish products. Operations are mostly on a small scale, as in the case of forest gathering. The reason for small-scale operations is similar: there is great biological variety not subject directly to mechanized techniques of the North Atlantic and not developed more fully to serve an alien industrial civilization. The commercial world merely snatches an item here and there, as in the tropical forest—the center of such work being in this case the West Indies. Sponging and turtling are examples.

Among fisheries, there is no large-scale counterpart of tropical plantations. Only a resemblance is discernible in fishing establishments of California and Gulf ports of the United States, which operate in tropical waters off Mexico, Central America, and the West Indies.<sup>3</sup> Their problem is somewhat like that of the banana trade and is similarly met by integration of tropical production, transportation to the United States, and distribution to market. In some of its phases, particularly those dealing with nonperishable fish products, the tropical-sea industry is like that of gathering tropical forest products. In this case, the work of gathering has to be done by North American fishermen instead of by natives of the tropical area. After all, the Amazon forest has working inhabitants, but the sea itself has none.

## Manufacturing

In this rural reconnaissance, primary attention has not been directed to manufacturing, and the subject is included here only to give it a pigeon-hole among other economic interests.

Manufacturing, in the modern sense of centralized mechanized processing, is alien to Latin America. The commercial industrial organizers of the North Atlantic countries have localized manufacturing at home as a particular perquisite of their own area, reaching far overseas for raw materials and markets, but maintaining locally the intervening

<sup>1</sup> Field study 11d, Chap. X.

<sup>2</sup> Field studies 12 and 13, Chap. X.

<sup>3</sup> Field study 6, Chap. II.

factory processes that make raw materials into marketable goods. Industry is not transplanted easily from old centers to new outlying districts.

Nevertheless, factories have been pushed into and pulled into Latin America, for good reasons. One sort has been discussed incidentally already. Some raw materials undergo preliminary processing more advantageously near the primary source of production than elsewhere, to reduce bulk or perishability before shipment. Accordingly, foreign interests have installed not only plantations and mines, but also sugar mills, stamp mills and smelters, sawmills, and packing plants.<sup>1</sup> For equivalent processes calling for less mechanization, there are also sisal mills, coffee and cacao plants, cotton gins, and wineries.<sup>2</sup> These are concluding parts of the primary production process and do not represent manufacturing as a distinct industry.

Factories of another sort are peculiar to city markets. Some products undergo final processing more advantageously near ultimate consumers than elsewhere, to increase bulk or perishability only after shipment, or to utilize common local materials. Such plants include gas and ice factories, bakeries, brickyards, soap factories, printing presses, assembly plants, power plants, and machine shops—all items of North Atlantic civilization and normal adjuncts of such cosmopolitan urbanization as is manifest in most Latin-American cities.

**SIZE TYPES.** Manufacturing can be divided into categories like those used for farming and other industries, from small-scale subsistence production to large-scale commercial production. At one extreme is household handicraft in Indian communities—for instance, the making of pottery for local use in high highlands.<sup>3</sup> At the other extreme is mechanized factory production—for instance, the refining of metals for export.<sup>4</sup> As in the case of farming, some small-scale industry produces items for export (Panama hats, for example), and some large-scale industry produces items for local supply (cement, for example).

However, the relations of manufacturing are more complex than those of farming and other industries of primary production. Manufacturing processes differ extraordinarily among themselves, in their inherent characteristics and their antecedent or consequent dependence on different kinds of production and consumption. Indeed, the distinction previously indicated, between processes carried on near sources of raw

<sup>1</sup> Field studies 1, Chap. IV; 1, Chap. V; 7 and 11, Chap. VI; 4 and 15a, Chap. VII. Field studies 3, Chap. II; 2, Chap. V; 18, Chap. VII; 2 and 4, Chap. VIII; 3, Chap. X. Field studies 11, Chap. VI; 4a and 10, Chap. X. Field study 6, Chap. VIII.

<sup>2</sup> Field study 7, Chap. II. Field studies 7 and 9b, Chap. VI; 1 and 2, Chap. X. Field studies 10c, Chap. VI; 5, Chap. X. Field studies 4, Chap. II; 13, Chap. IX; 6, Chap. X. Field studies 1 and 11, Chap. VIII.

<sup>3</sup> Field study 1, Chap. II.

<sup>4</sup> Field studies 2, Chap. VIII; 3, Chap. X.

material and those carried on near markets, seems to serve as a better guide to the distribution of manufacturing and its presence or absence in Latin America than does the classification by size or commercialization.

**LOCATION TYPES.** Therefore, consider further a classification based on relations to materials and markets.<sup>1</sup> At one extreme are processes held close to sources of raw material, located with reference to the underlying industry, and not to be interpreted as a separate industrial development, no matter how imposing may be the size and mechanization of mill structures.

These are located in mining districts and in the five habitats that have commercial farming or lumbering. High highlands are the one habitat excluded, having practically no such processes, except in connection with mining. Within habitats, establishments are localized with reference to commodities that require preliminary processing—at shipping points for cattle farms of humid middle latitudes,<sup>2</sup> and in sugar plantations (but not banana plantations) of low-latitude rainy lowlands.<sup>3</sup> The larger the scale of processing, the fewer the plants and the greater their localization within their districts. Thus, meat-packing plants are relatively large and few in livestock regions, whereas cheese factories are relatively small, numerous, and widespread in dairy districts.

At the other extreme in the classification are processes held close to markets. These are located mostly in the core regions of the countries, and development corresponds roughly with national populations. Within core regions, factories are localized especially in the larger cities, which means especially in the national capitals in most cases.<sup>4</sup>

Between the two extremes are processes not attracted strongly either to sources of material or to markets, but located at intermediate places, for other reasons. It is these processes which form manufacturing as a distinct industry and mark genuine industrial districts. "Intermediate places" may be on a very roundabout route between the point where raw material originates and that where a finished product is consumed (as in the case of materials shipped from Latin America to Europe and manufactured there into products for Latin-American markets). "Other reasons" for such location include advantages of labor, power, commercial centrality, and established organization; and the processes so located usually involve elaborate fabrication for which one or more of the foregoing advantages are vitally important.

<sup>1</sup> A variant of this classification, for specific application to Puerto Rico, is used in the following article: R. S. Platt, A Classification of Manufactures, Exemplified by Porto Rican Industries, *Annals of the Association of American Geographers*, Vol. 17 (1927), pp. 79-91.

<sup>2</sup> Field study 6, Chap. VIII.

<sup>3</sup> Field study 1, Chap. IV.

<sup>4</sup> Two of the larger cities that are not national capitals, but that have a special reputation for manufacturing are Medellín (Colombia) and São Paulo (Brazil).

Latin America has none of these advantages now available in a large way and shows no signs of competing with the North Atlantic area as a world center of industry, receiving raw materials and selling finished goods to the ends of the earth.

Products of Latin-American manufacture favored by industrial advantages for entry into world markets are not easy to find. Paradoxically, the one habitat that is poor in commercial resources, high highlands, provides the most striking examples. Panama hats are made not only in the lowlands where the material is produced, but also in the high highlands of Ecuador and Colombia, favored by cheap skilled labor.<sup>1</sup> Obviously, the industry does not depend on modern industrialization. Indeed, it is at the opposite pole—a bit of household handicraft, stimulated by foreign demand to production far beyond local needs.

Similarly, other items of high-highland handicraft have become objects of luxury demand abroad as well as of conventional supply at home. Thus textiles, pottery, and basketry are now familiar in the United States, as exports from high-highland farming communities (of Mexico, Guatemala, Ecuador, and Peru), which have had little else to offer in world trade and so have preserved indigenous arts and crafts.

These examples of industry for export are plainly insignificant and support the statement that Latin America is not competing with the North Atlantic area as a world center of manufacturing.

**INDUSTRIALIZATION.** Nevertheless, industrialization is progressing in Latin America, owing not to a shifting of the world center but to its disintegration. A dispersion of manufacturing is in evidence, from the old center to new areas, particularly to Latin-American countries as productive independent market areas.

The trend has some aspects of a short circuit eliminating the round-about route from sources of raw material to North Atlantic factories and thence back to Latin-American markets: obtainable materials are fabricated for local consumption. The trend is favored by hindrances to transportation overseas and by easy dissemination of industrial methods and equipment. It is accentuated by tariff barriers protecting domestic markets against imported goods (a type of encouragement given primarily to industries that require relatively slight inducement to be attracted into market areas).

The kinds of manufacture chiefly involved are those in which fabrication is relatively simple and markets are ready at hand. These represent an approach to processes already described as held "close to markets" and located in the core regions of the countries.<sup>2</sup>

<sup>1</sup> Page 248.

<sup>2</sup> There are no absolute divisions in the classification of manufacturers as (1) "close-to-materials," (2) "close-to-markets," and (3) "intermediate." The recognition of but three divisions is justified only in broad generalizations on the simple operations common in

Textile manufacture exemplifies the type. Textile mills, large or small, operate in all the larger countries. Most of them are in core regions, many of them located in the larger cities, some located elsewhere at power sites and industrial towns.

A conspicuous development of such industry is in the core regions of the most populous two countries, Brazil and Mexico. The large domestic market is the primary attraction. Other advantages are the associated resources of general productivity and labor supply and the additional incidental resource of water power easy to use. A considerable development has taken place also in Argentina, which has the most commercialized population, and in Chile, which has a smaller population but relatively large resources of power, labor, and industrial experience.

Latin America is not an economic unit in manufacturing, but 20 separate national units. The subdivision is due not only to tariffs and nationalistic policies in general, but also to a greater lack of commercial and transport connections of the countries with each other than with North Atlantic centers. The trend toward dispersion of manufacturing in the world is not creating a Latin-American continental center to succeed the old North Atlantic world center.

Whether the trend toward industrial dispersion among self-sufficient national units is to continue or is to be reversed will depend on the Second World War, and the postwar reorganization.

### Résumé of Habitats and Economies

Latin America has not been simplified directly by reclassification in divisions other than countries. The process has furnished additional sets of categories, not coincident with countries or groups of countries.

**INTRICACY.** Six habitat types have been enumerated, represented by climate but derived from culture, and distinguished by different types of farming together with associated types of minor economic interests (Fig. 491). Another kind of division has been introduced for mining, scattered through the habitat areas, but without climatic implications, and referred separately to rock structure (Fig. 7, page 15). Habitats and economic interests cut across countries (Fig. 2, page 10).

Economic variety is complicated further by remnants of successive culture periods (Fig. 495). Among these at least three divisions of time are not to be ignored, and in each time division at least two areal subdivisions: in the Pre-Columbian Period, both sedentary and mobile Indian economies (Fig. 492); in the Colonial Period, highland mining, grassland livestock, and tropical plantation economies (Fig. 493); and, in

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Latin America. For analysis of more complex industrial development the "intermediate" group is subject to manifold subdivision, conceivably arranged on a scale of relative evaluation from end to end.

the Recent Period, both commercial exploitation and immigrant settlement (Fig. 494). Survivals of the past include not only kinds of economic order but also kinds of people: Indians; Colonial *criollos* and Negroes; new technicians and immigrants.

Thus, the total number of complex categories mounts theoretically to more than 100 combinations, apart from the division into countries. Moreover, variations fail so persistently to correspond with country boundaries that individual countries seem to contain nearly a maximum number of distinct types on every basis. Different sorts of categories



FIG. 495.—Survival and overlap of cultures. The Pre-Columbian Period represented in Indian dress and market produce; the Colonial Period in architecture, burro, and Spanish language; the Recent Period in station wagon and poster. A market street in Huancayo, Peruvian highlands, December, 1935.

fail to coincide with each other as well as with countries. Some plantation districts are populated by Indians, and others by Negroes.<sup>1</sup> Some coffee districts are populated by Indians, others by Colonial *criollos*, and others by recent white immigrants.<sup>2</sup> Middle-latitude grasslands were equivalent to tropical savannas, and middle-latitude forests to tropical forests in pre-Columbian and Colonial economies (Figs. 492 and 493); but in Recent economy middle-latitude grasslands and forests are classed together rather than with tropical areas (Fig. 494). Some types of habitat form the core regions of certain countries and outlying regions of others.

**PATTERN.** Yet the maximum number of differences possible in theory is not attained in practice. The ultimate objective of reclassification

<sup>1</sup> Field study 3, Chap. VII; Field studies 4, Chap. III; 1, Chap. V.

<sup>2</sup> Field studies 3, Chap. III; 1, Chap. III; 2, Chap. X; 3, Chap. IV.

tion is not to multiply categories, but to lead toward integrated and consistent concepts. A first glance brought recognition of great complexity within individual countries—so great as to seem composed of nearly endless diversity in which each countryside is quite unique. Analysis has brought recognition of equivalent elements wherever they appear and has reduced endless to limited diversity by grouping items found common to various places and countries.

Habitats and economies turn out to be relatively few in number for practical use and general understanding. Observed complexity appears as a coherent product, of imposition on several given habitats of several cultures by several peoples. Latin-American countries are not storerooms of inventory stuff listed together because of chance proximity; they are concordant parts of a coherent whole in lively equilibrium—not the static equilibrium of a rock pile, but the dynamic equilibrium of a tug of war, or of a motor, or of an organism. From this point, it is possible to proceed toward better integrated understanding of Latin America.

## Chapter XII. Latin-American Political Structure in the World Order

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The geographic pattern of Latin America is neither a kaleidoscopic rosette nor a formal mosaic but is like a picture painted with mixed pigments on a motley background and constantly retouched. Cultures are spread successively on habitats and are developed, modified, and masked, in isolation or in conjunction: cultures of mobile forest Indians pervading but not suppressing nature; of sedentary high- and dry-land Indians spreading seeds and cultivation; of Europeans bursting in for what they want, adapting their techniques to meet and coerce nature; of Africans bringing durable elements of their culture; and of recent settlers duplicating their homes elsewhere.

Culture includes not only economies, discussed in the preceding chapter, but also political organization, ignored as a phase of culture up to this point. Even though countries individually have not been taken for granted and each has been accounted for in substance and form in previous chapters, nevertheless the system itself, of having countries as political units, has been taken for granted. For further understanding, countries also need to be examined impartially. Economic and political phases of culture belong in the same plane of investigation, inextricably associated with each other, as well as with specific times and places.

### Political Structure

The same periods of time that have served to distinguish economies show also political contrasts, and these political characteristics similarly are represented by remnants and modified products in the present pattern.

**FROM THE PAST.** Pre-Columbian political organization, serving the basic political purpose of control over groups of people occupying land, survives in communities and tribes, among both sedentary high- and dry-land Indians and mobile forest Indians (Fig. 496). Surviving fragments are independent of external authority in some cases among forest Indians and are nearly obliterated by external authority and internal modification in most cases among sedentary people. Active survival is

seen in elementary local units covering small areas and groups of people; remnants of higher central authority, of Inca and Aztec empires, are hardly perceptible.

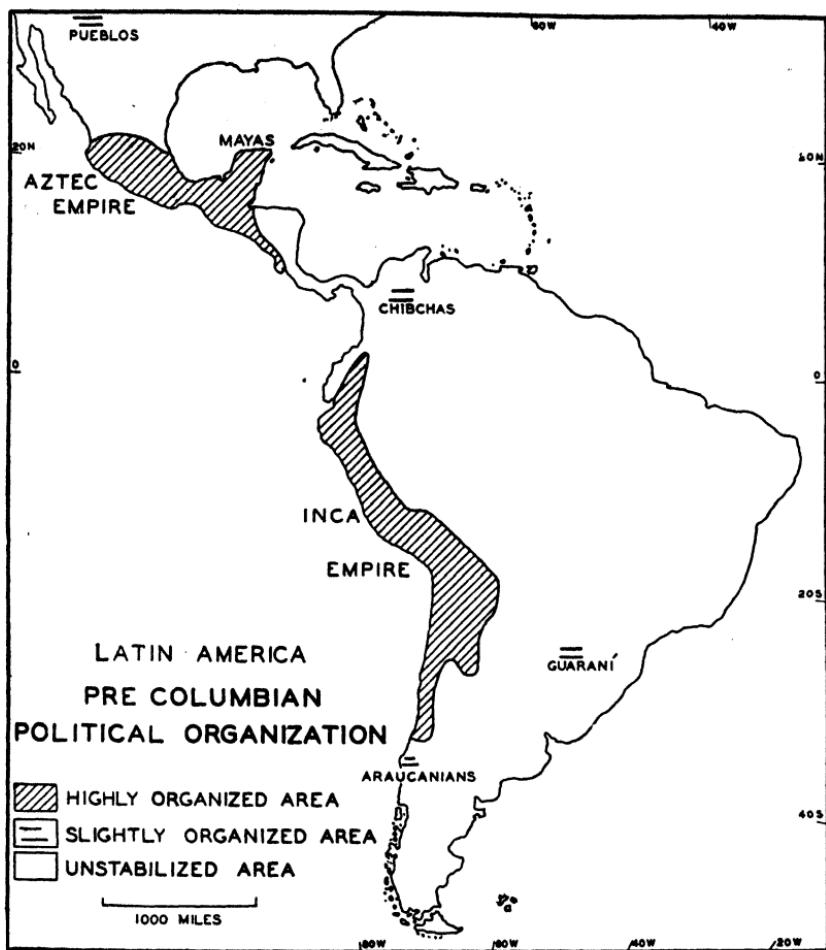


FIG. 496.—Fifteenth century. The name "Inca Empire" applies to practically all the "highly organized" area in South America, but the name "Aztec Empire" only to part of the northern area. (Data from A. L. Kroeber, "Cultural and Natural Areas of Native North America," pp. 121, 222, Figs. 1A, 6; University of California, Berkeley, 1939; E. Nordenskiöld, "Sydamerika," p. 210, Uppsala, 1919.)

Colonial political organization survives in both small and large units: in modified indigenous communities as well as in other settlements; in districts, municipalities, dioceses, departments, provinces, and states.

Indeed, even sovereign states of Latin America are present expressions of Colonial administrative subdivisions.

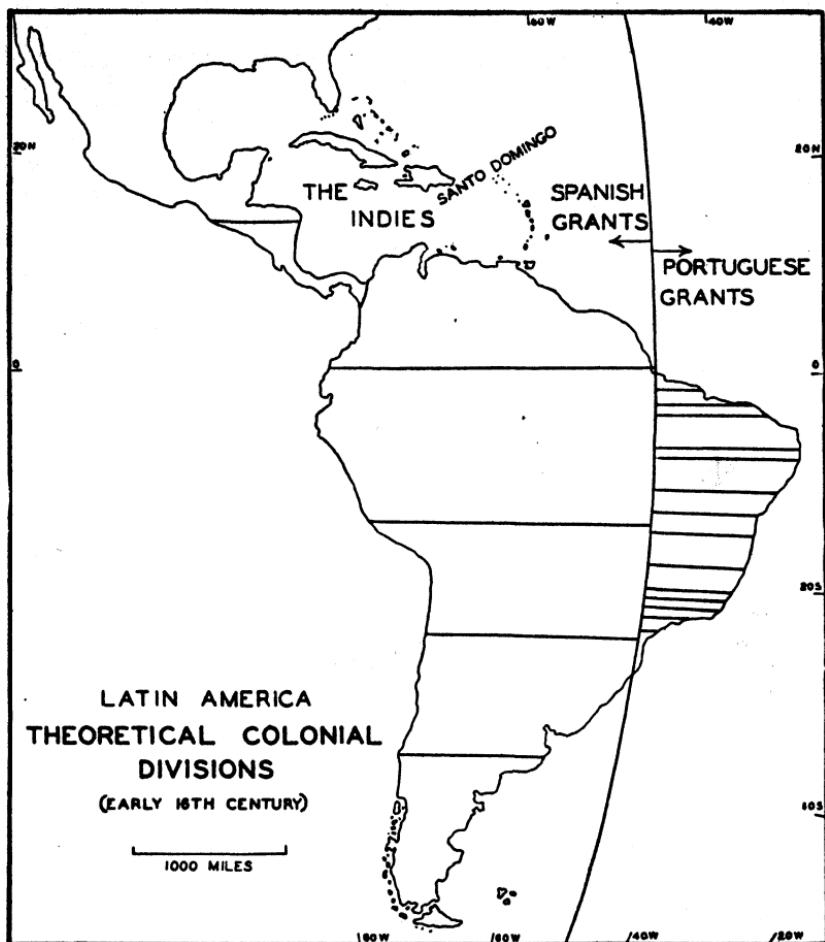


FIG. 497.—Divisions in theory, never fully established in practice. Grants made successively, not simultaneously, and described in words but never laid out on an accurate map or on the ground during the time when supposedly in effect. (Data from H. H. Bancroft, "History of Central America," Vol. 1, pp. 240, 294-297, San Francisco, 1886; A. C. Wilgus and R. d'Eça, "Outline History of Latin America, pp. 45, 52, Barnes & Noble, Inc., New York, 1939.)

During the Colonial Period, Latin America was divided into administrative units according to preconceived ideas of political organization brought from Spain and Portugal, with ultimate regard for the local grouping of population and the relative accessibility of the places to be

administered (Figs. 497 and 498). Pre-Columbian political units were used as administrative divisions where they fitted conveniently into the imported scheme; the network of jurisdiction was extended over out-



FIG. 498.—Main divisions and subdivisions, with capital cities indicated by dots. (Data from W. S. Robertson, "History of the Latin American Nations," pp. 142, 143, 155, 227, D. Appleton-Century Company, Inc., New York, 1922.)

lying territories to cover in theory the whole land area. Officials from Europe took charge and applied customary European techniques to local problems.

Such subdivision, based on physical separation by distance rather than on other sorts of differences, led commonly to putting similar kinds

of people and land into different units and different kinds of people and land into the same unit, taking together Indians and Europeans, good land and poor ill-defined outlying territory, according to propinquity.



FIG. 499.—In general, small countries and core regions have small provincial divisions; and large countries and outlying regions large divisions. The four ports added to the list of capitals are for reference in relation to highland capitals. (*Boundaries from sheets of the American Geographical Society, "Millionth Map of Hispanic America," New York.*)

Independence involved superficial rather than fundamental change (Figs. 498 and 499). The local aristocracy of European stock took charge, in place of new appointees from abroad. The old distributions of people

and prestige remained, and the old modes of organization and control. The same ecclesiastical ties remained. The same capitals continued to dominate the same territories. Even today, international boundary claims in many instances rest on old divisions of Colonial jurisdiction.

When fractions of the old regime became independent nations, local structures took on a foreign scaffolding of abstract forms and names. A pattern simulating that of Europe, in sovereign states large and small with full-grown ideology, was adopted suddenly by severance of Colonial ties instead of slowly by national accretion. The nomenclature of a federal union of separate colonies like that of the United States was used in many cases for countries formed, not by uniting old colonies, but by subdividing colonial units into states.<sup>1</sup>

Since then, marks of distinctive nationality have appeared in most if not all the countries. A federal system of constitutional republican representative democratic government has taken root and become not only a name but a reality in some countries.

Yet in general the political structure of the present is a heritage of the Colonial past. From country to country a familiar pattern is repeated. Administration centralized in a Colonial capital holds jurisdiction over a populous region round about and over diverse outlying regions beyond. Heirs of Colonial aristocracy maintain a hold on land, labor, and government, continuing old systems of control and looking dubiously at the recent economic activities of alien interests in outlying regions.

**PERSISTENCE.** From country to country the pattern persists in spite of changing personnel and is not merely held together by genealogical succession. In fact, the system fails to coincide with divisions of racial stock. European organization, imposed on Latin America by a few technicians sent from Europe, survives not only in aristocratic families descended from foreign officials and still endowed with power, but also more broadly through the population in existing national structure.

From country to country the pattern is repeated in general composition, even though different habitats set the stage. The core regions of the various countries differ from each other in habitat, almost as much as the outlying regions differ among themselves. Indeed every type of habitat, except chronically rainy lowland, furnishes the setting for the core region of at least one country.<sup>2</sup>

Striking features of the pattern stand out in high relief in five countries where the core regions are located in high highlands. Old capitals in noncommercial Indian communities stand like castles in the Middle Ages, held by nobles and their vassals, each on a hilltop dominating

<sup>1</sup> Brazil, by contrast with the Spanish countries, has been from the outset a union of all Portuguese America.

<sup>2</sup> Pages 492, 495, 497, 499, 501, 504.

lands and people round about, looking down upon new trade centers with surprise and apprehension, yet with interest, willing to take advantage and provide protection, though not to lose control. The high-highland capitals are on a larger scale and their tributary lands too far to be directly visible below, but the relations are analogous. Mexico City looks down upon Tampico, Bogotá formerly on Panamá City and now on Buenaventura, Quito on Guayaquil, and La Paz on the Chaco (Fig. 499).

Capitals in habitats other than high highlands generally are less detached from recent specialized production and find themselves in the midst of foreign economic revolution—Lima among plantations in dry lowlands; San Salvador and San José in coffee districts of low highlands; Panamá and Habana as commercial ports in seasonally rainy lowlands; and Buenos Aires and Montevideo as commercial ports of the great farming regions in middle latitudes. Yet even in these habitats, as good for recent as for Colonial occupance, the capitals have remained Colonial with modernistic adjuncts alongside; control of government and land has continued to be a matter of Colonial heritage and separate from commercial interests. Thus political organization of one period survives into another, besieged in economic revolution but firmly held.

**CONSERVATISM.** Economic as well as political systems tend to be conservative in resisting change; but, of the two, the political seems more so. Those in charge of economic interests, devoted to producing goods, want what changes in operation may bring. Bigger and better crops, plantations, mines, and factories gratify at once landowners, tax gatherers, and laborers. But those in charge of political interests, devoted to maintaining orderly control, want stability rather than change. In all the countries, economic changes have proceeded far and wide, but movements toward alteration of political structure have met instant stiff resistance.

Old political organization has survived not merely because of internal conservatism and the strength in each country to resist aggression, but because other countries refrained from overt aggression, in accordance with the innate code of the sovereign-state system (as enforced by the dominant world powers), under which Latin-American Colonial divisions were set up as independent nations. Under the code, each country is considered supreme within its borders and looks to no superior in the world order; its claim against violation by neighboring states or any others is as authentic as that of foreign nations from which the rules were learned. Heretofore, the code has been in force in Latin America and the world: foreign governments have refrained from political aggression in Latin America—in contrast with foreign economic interests, which have had a code encouraging international operations.

**DISCOMFORMITY.** Thus, economic organization in Latin America has advanced according to resources, in keeping with the times; old forms

have been replaced by new in prompt response to world demands, in integrated economic order. But political organization has lagged in the advance and so is out of keeping with the times, particularly unadjusted to the demands of foreign economic development.

For Latin America in general, the main features of the present pattern include indigenous subsistence populations distributed in high- and dry lands of the west; transplanted populations organized for new commercial projects in tropical rainy districts of the east; immigrant populations recently arrived for commercial farming in middle-latitude regions of the south; ultramodern mining enterprises scattered in spots in each climatic habitat—all set in an old-fashioned frame, formed by Colonial realms cut into sovereign states.

Conservatism is not to Latin America's discredit. The world of sovereign states is similarly conservative; Latin America, as a component part, reflects its share of tardy fitful procedure in a world of historic-geographic complexity.

### Boundary of Latin America

In view of Latin-American relations in the world and of the temporal quality of political division, the boundary thus far taken to limit the area of discussion comes into question. Latin America is commonly assumed to end at the international boundary between Mexico and the United States. But this is merely a line within the system of political division to which both Mexico and the United States belong, implying no qualitative difference between the units thus bounded. In world political organization, the 21 republics of North and South America are equivalent parts existing under a common code as sovereign states. Nonpolitical elements of culture and types of habitat have not been bounded by the same line across North America before or since the rise of nations (Fig. 500). The national boundary between Mexico and the United States cuts through natural regions, as previously stated.<sup>1</sup>

**OVERLAP.** Latin America overlaps part of the United States in fundamental ways, extending north through New Mexico and Arizona as well as into California and Texas. The Pueblo district of the upper Rio Grande has all essential characteristics of Latin-American high highlands,<sup>2</sup> not only in its monuments of a historic past but also in the vital activities of a vigorous present (Fig. 496). Here in fertile unwooded basins among mountains, subject to periods of warmth and frost, are indigenous sedentary subsistence Indian communities depending on cooperative irrigation and dry farming, growing food crops, especially corn, having houses of clay and handicrafts to fill domestic needs; live-

<sup>1</sup> Page 20.

<sup>2</sup> Pages 492, 494-495.

stock establishments and mission parishes of Spanish Colonial origin; and recent commercial settlements. The environment suits old forms of occupancy but lacks resources for great recent alien economic change, thus tolerating the survival of old forms and therefore now attracting alien interest in the surviving forms, interest in old domestic handicraft for use as commercial luxury art<sup>1</sup> and in Colonial establishments for use as

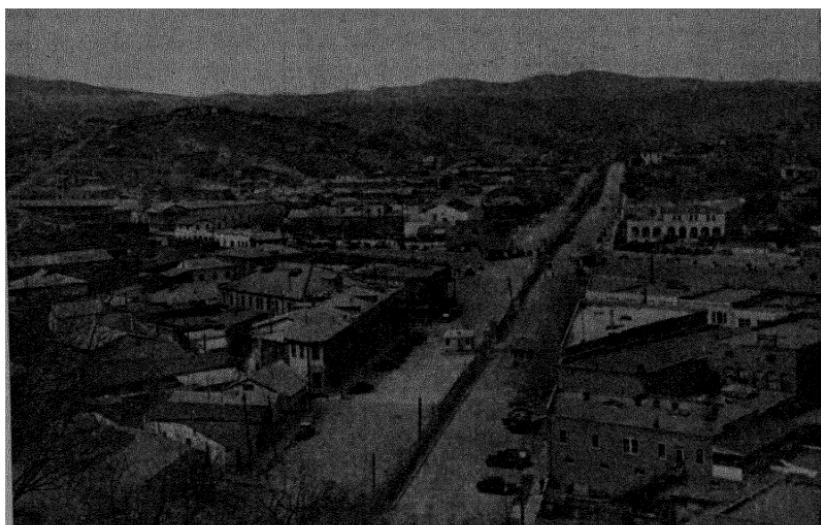


FIG. 500.—“The Border” marked by a fence between parallel streets. Nogales (Arizona and Sonora), an urban focus of international traffic in a sparsely populated semiarid highland region. View from a hill cut by the boundary, looking west, the United States on the right, Mexico on the left, March, 1939.

At the border, travelers are conscious of international differences not visible in a landscape view. But such differences represent mainly a localization of specific contrasts developed along the line of contact between the countries and not characteristic throughout each country. Moreover, differences noted by travelers crossing the line are easily exaggerated in imagination.

“dude ranches.” Pre-Columbian, Colonial, and Recent national times all appear at once in the living elements of population, land tenure, government, language, art, religion—all inheriting and adhering to the land in conflict and compromise not yet ended.

Spots of copper mining in Arizona are hardly distinguishable from those across the border in Mexico and in the Andes—succeeding Spanish mines of precious metals, and at the same time representing a fresh impulse under alien control and technology from North Atlantic regions.<sup>2</sup>

<sup>1</sup> Page 514.

<sup>2</sup> Page 507.

California and Texas have been compared already with Chile and Argentina,<sup>1</sup> and the comparison could be carried further to include many elements of culture as well as habitat, perceptible not only in dead but also in living matter—pre-Columbian sedentary and mobile occupancy; Spanish Colonial dry-land and grassland political and economic order; recent alien penetration from North Atlantic regions.

National traditions of the United States include Latin-American as well as Anglo-American elements—cowboys and ranches of the “Wild West” as well as Pilgrims and planters of the East. The southeastern part of the United States seems at first glance more sharply distinguished from Latin America. But the shore lines of the southeast are not universal boundaries or even commonly effective as general limits. Island and mainland shores are connected by seaways and are approached indiscriminately from the sea. Florida, like Central America, is associated properly with the West Indies.<sup>2</sup> Tropical habitats and cultures of eastern Latin America do not stop short of the United States, and their subtropical transitional margins extend northward like corresponding southern margins in Paraguay and South Brazil. Traces of pre-Columbian occupancy survive in mobile Indian communities; traces of Colonial order survive in port settlements of Florida and the Gulf coast; commercial specialties are not lacking, from forests, fisheries, and plantations, exploited for North Atlantic markets. The slave plantations of the past and the Negro population of the present in southeastern states belong in a larger setting, with the Colonial plantations and Negro populations of the West Indies and Northeast Brazil.<sup>3</sup>

Latin America does not stop abruptly in the southern part of the United States. Latin Americans inhabit the Great Lakes region in greater numbers than the total population of some Latin-American capitals. People of Indian blood from subsistence communities of the Central Plateau of Mexico have come to northern cities in response to demands for labor and there live and work side by side with people of African blood from old plantations of the southeastern states under the direction of white men of European blood, thus repeating the story of highland Indians and West Indian Negroes who meet in American banana plantations of eastern Guatemala.<sup>4</sup>

**INTER-AMERICAN TIES.** The United States is in a sense one of the countries of Latin America—judged by what it has of Latin-American people, area occupied in Latin-American ways, variety of habitats and communities typical of Latin America, and local pride in and promotion of Latin-American culture. The political boundary of the United States has

<sup>1</sup> Page 330.

<sup>2</sup> Pages 118-115.

<sup>3</sup> Pages 115-121, 402.

<sup>4</sup> Pages 97, 99.

been taken by custom to signify a romantic fiction of universal difference north and south of "the Border." As a matter of fact, differences from place to place, in habitat, people, and culture and in attitude toward time, money, politics, art, love, and commerce, are as great south of the Border as north of it, and all general attitudes prevalent in Latin America are present in the United States.

There are other divisions in the Americas more profound than that marked by the political line between Mexico and the United States: for example, (1) a general division between west and east, between high- and dry-land sedentary Indian farming and Spanish mining habitats on the west, and humid lowland mobile Indian forest and plantation habitats on the east; (2) a general division between tropical habitats of exploitation on the one hand, and middle-latitude habitats of settlement, north and south of the tropics, on the other; (3) a general division between the central and the peripheral realms in world organization—on the one hand, the twin centers of commerce, capitalism, and industry on both sides of the North Atlantic, and, on the other hand, the four corners of the world.

The first two examples are distinctions of habitat that have been analyzed in more detail.<sup>1</sup> The third is a distinction between the origin and the spread of Occidental culture and between the focus and the reach of world power. This last is still to be discussed.

### Latin America and the North Atlantic<sup>2</sup>

Latin America appears on the map as an irregular continental area attached to the United States by a continuous strip of land and separated from the rest of the world by oceans—particularly from Europe by a long stretch of ocean. The land appears to be composed of sharply defined countries packed together, each in contact with the next, in a solid row from the United States to Panamá, and beyond Panamá composed of countries in a cluster, fitting snugly together, confronting and pressing against each other along extensive international boundaries (Fig. 499).

**SEA LINKS.** The map, as previously remarked, is deceptive as an expression of reality.<sup>3</sup> Latin America is not in reality sharply distinguished from the United States at a national boundary and is not in practice attached to the United States by land. Of the 20 countries south of the Rio Grande, only one is reached effectively by land from the United States. In practice, most of the countries are not actively attached to each

<sup>1</sup> Pages 487-491, 508.

<sup>2</sup> R. S. PLATT, Latin America in World Affairs, *Journal of Geography*, Vol. 40 (1941), pp. 321-330.

<sup>3</sup> Pages 9, 10, 17, 18, 525-528.

other by land and do not confront or press against each other across international boundaries (Fig. 501). In most cases, traffic by land from

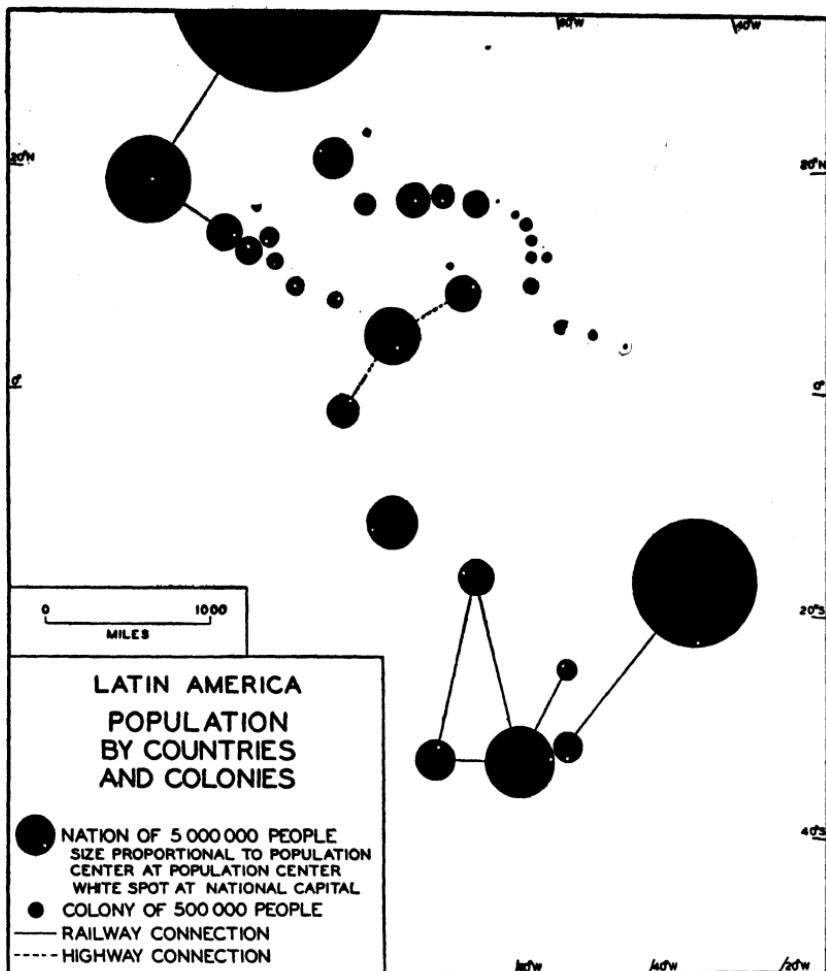


FIG. 501.—A map omitting shore lines and showing populations but not territories. Valid illustration of certain facts: the nations are primarily groups of people rather than tracts of land, and their external connections are generally by sea rather than by land. Even where railway or highway connections exist they are relatively unimportant (except between Mexico and the United States). A highway connection between the capitals of Bolivia and Peru has been completed since the map was drawn (1941) but is no more important than others shown. [R. S. Platt, "Latin America in World Affairs," *Journal of Geography*, Vol. 40 (1941).]

one country to another is almost as inconspicuous in Central and South America as between the islands of the West Indies. Latin-American

countries are attached by water and air to each other and to the rest of the world, especially to North Atlantic countries (Figs. 502 and 503).

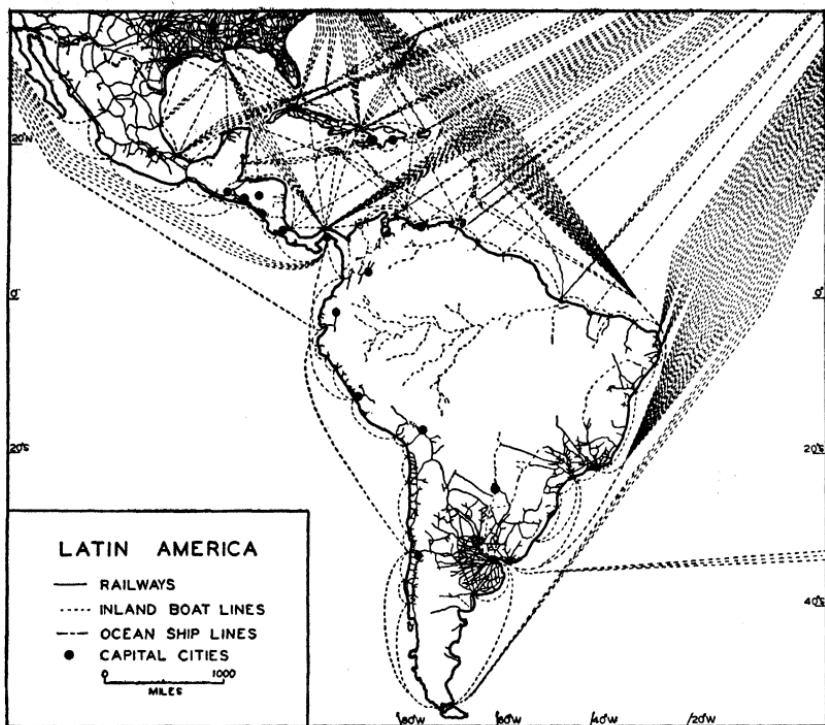


FIG. 502.—Latin America hangs like a pendant—not by land connection with the United States, but by sea connections with countries on both sides of the North Atlantic, in North America and Europe. On the map each ocean ship line represents one steamship company before the Second World War (1938). To simplify the map, multiple lines have been merged into a single line from port to port along continental shores. Inland boat lines are shown where there is regular service by steamboat or launch. Railways shown are common carriers of either broad or narrow gauge. (*R. S. Platt, Latin America in World Affairs, Journal of Geography, Vol. 40 (1941)*.)

The subject of transportation is often mentioned in the text but seems to require no more analysis in connection with the rural studies and is not treated as a separate topic in the closing chapters. For further interpretation of Latin America, more complex analysis of transportation is in order. A preliminary study is presented in R. S. Platt, *Inland Transport in Latin America, Proceedings of the Eighth American Scientific Congress (Washington, D.C.) 1940, Section X.*

For the most part, individual Latin-American countries are connected more actively and effectively with Europe and the United States than with each other, and the connections in both cases are by sea and air. Both politically and economically the countries are separate and relatively independent of each other, mutually respecting their sovereignty and

looking elsewhere for complementary foreign relations. In a few cases, there is recognizable inequality and dependence among countries, but in

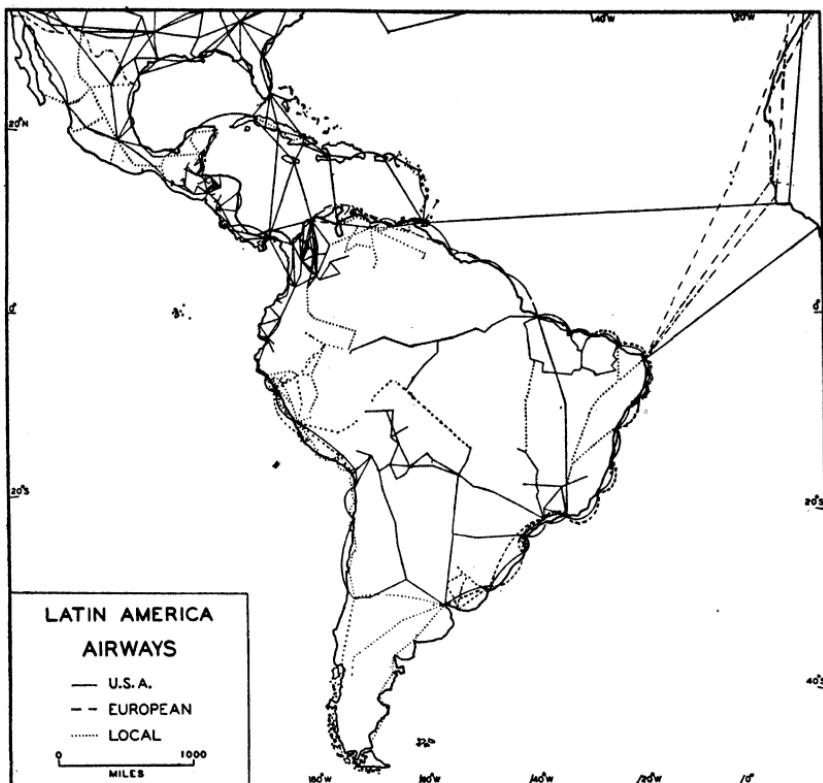


FIG. 508.—The airline pattern bears a resemblance to that of surface lines (Fig. 502), including overseas connections with countries on both sides of the North Atlantic and inland penetration from coastal centers to inland frontiers.

European air lines within Latin America have almost disappeared since 1939, the only remaining representative on the map being the system of the Netherlands in the Caribbean area, based on the Netherlands colonies. The French lines were discontinued after the fall of France, and the lines of the Axis powers have come under the control of local governments or the United States. Domestic networks in Colombia, Ecuador, Bolivia, and Brazil, established by Germany, are operated by Pan American Airways.

The former transatlantic routes of France, Germany, and Italy are indicated on the map, although not in use (1942). The Italian connection, last of the three, was broken in 1941. The long transatlantic route from Africa to Trinidad is that used by Pan American Airways for westbound trips from Lisbon to the United States during winter periods of unfavorable weather in the North Atlantic. The other route between Brazil and Africa is that of American air traffic to the Near East.

general there is less interdependence than individual dependence on distant sources of power.

The overseas connections of Latin America are not markedly in favor of the United States as compared with Europe; and, for the great east coast countries, even the length of the route is not markedly less. The

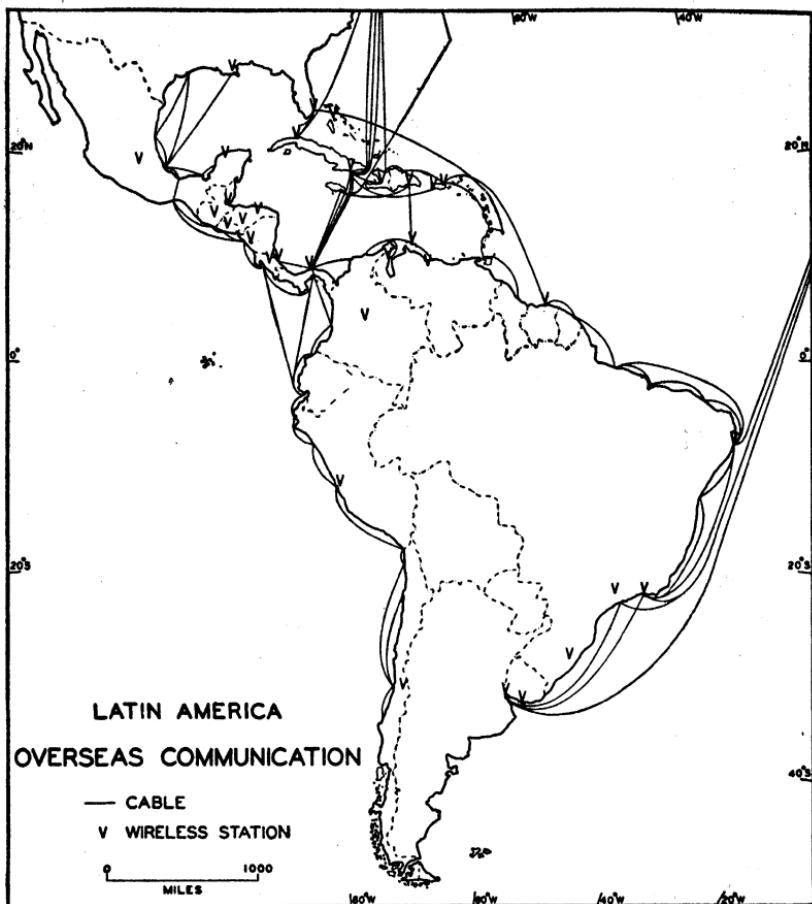


FIG. 504.—The communications pattern bears a resemblance to those of transportation (Figs. 502 and 503), in overseas connections with countries on both sides of the North Atlantic. Inland penetration from the coast also is characteristic, though not shown on the map.

connections with the United States are not made any better by an isthmian strip of land between continents, as compared with an ocean to be crossed (Figs. 502 to 504).

**TRADE TIES.** Economic relations of North Atlantic centers with Latin America are consistent and uninhibited. Centers in Europe and the

United States have assumed an active role, as commercial, financial, and industrial headquarters of the world, whereas Latin America has played a passive role, as an outlying part of the world economic order. North Atlantic business interests have chosen rich areas for specialized production and

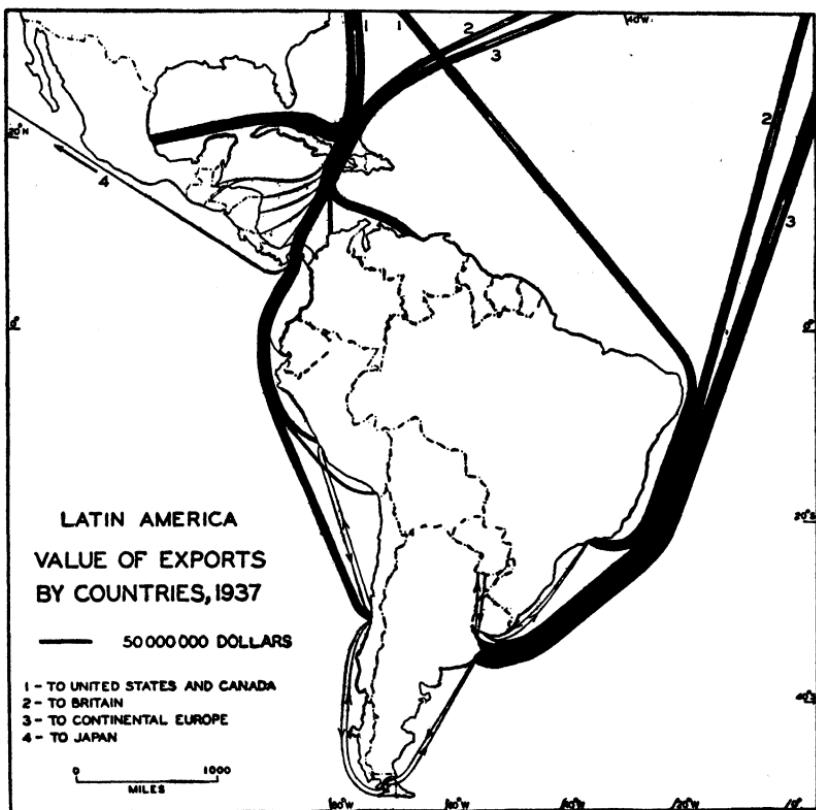


FIG. 505.—The prewar pattern, flowing in well-established lines, now disrupted but not yet uprooted. The underlying bases remain largely unchanged, though not unchangeable in the course of world revolution.

strategic points for trade. There they have established branch offices and subsidiary enterprises—trading posts, transportation lines, plantations, mines, and factories. In many cases, technical and administrative representatives from the North Atlantic have held direct control; in many others, local inhabitants cooperate and are encouraged in local enterprises fitting into foreign programs. Local governments, landowners, and laborers have acquiesced, receiving taxes, rents, and wages and hoping for greater benefits. Industrial equipment, manufactured goods, and

capital have flowed into Latin America; raw materials, foodstuffs, and some financial returns have flowed out to the North Atlantic (Fig. 505).

World political order is not coordinated formally with economic order.<sup>1</sup> The Latin-American countries are detached fragments of European Colonial organization, in contrast with the connected international links of North Atlantic business organization. In the Colonial Period there was strong correlation between political and economic organization; Spanish and Portuguese economic activities, as well as British, French, and Dutch, were distributed, respectively, and almost exclusively under their own flags. When political ties between Latin America and Europe were broken early in the nineteenth century, following the example set by the United States, economic ties with Europe were kept and multiplied.

**POLITICAL DIVORCE.** Consequent separation of political and economic interests is shown by reference to existing European colonies. Whereas political control from Europe is confined officially to the colonies, economic control by representatives from Europe is not thus confined; in fact, European business activity in colonies is relatively insignificant as compared with such activity in independent countries. Economic activity is directed less by political possession or patriotism than by intrinsic economic opportunity. British economic interest is vastly greater in Argentina than in British Honduras or any other Latin-American British colony. Because the colonies represent remnants of foreign political control, all relatively unimportant as compared with other Latin-American areas even when they were acquired, and generally more unimportant now, their place in Latin America is a minor one, both politically among independent neighbors, and economically among outposts of North Atlantic business.

Thus, Latin America is composed politically of major independent fragments and minor colonial remains of past imperialisms, fixed in status before the Industrial Revolution had affected world order. Since the time of fixation, North Atlantic economic order has continued to evolve and spread, and new offshoots of foreign business have continued to enter Latin America, though the countries have remained politically detached.

Nevertheless, formal separation of political from economic organization does not signify actual independence. Political as well as economic order has depended on North Atlantic centers. The sea has been the common medium of international intercourse for all the countries of Latin America. The principle of "freedom of the seas" is presupposed in keeping international relations as they have been, with economic interdependence and political independence among nations. Establish-

<sup>1</sup> Pages 524-525.

ment of the principle has been attained in modern times through positive control, not just through negative circumstance. The sea has been cared for as a highway, not disregarded as a no man's land.

**OLD ORDER.** Control over the medium of intercourse, and therefore over maintenance of old arrangements, has been vested in countries of the North Atlantic, particularly in the United States and Britain, with the cooperation of other nations contented with their recent status.

In general, controlling interests in the United States and Britain have been satisfied to operate within the established framework of political units—recognizing theoretical equality in the family of nations; holding strategic bits of land; depending on their own resources and organization and on reciprocal economic relations; and hoping for continued success in Latin-American affairs without exercise of force.

At times the United States has seemed dissatisfied with political conditions and has been suspected of an intent to wipe out Latin-American independence. A normal sequence of events led to these uncertainties. American business interests, grown strong within the United States, found inviting opportunities outside the United States and reached to take advantage of them. American national policy, embracing both sides of the continent, reached to Central America for a waterway to connect the Atlantic and Pacific coasts, thus bringing Panamá within the domestic transportation system of the United States and incidentally giving the United States an additional interest in 13 Latin-American countries.<sup>1</sup> Both economic and political interests have been expressed in forceful language, backed by force of arms on some occasions of disagreement with Latin-American governments.

Under the Monroe Doctrine, broadly interpreted, the United States has assumed a right to maintain order in the Western Hemisphere. This has raised a dilemma in some cases, however sincere may have been the desire of the United States for international good will and mutual respect for recognized rights in the Americas. To uphold the independence of all nations however small, and at the same time to enforce good behavior and protect established interests, is an ambiguous task. Britain, acting as a silent partner in maintaining the *status quo*, has been more fortunate and graceful than the United States. Without expressing direct interest or claiming jurisdiction over the territory of other nations, Britain has in the past controlled the medium through which inter-American and intra-American activities take place. Because the sea belongs to no one and because strategic islets that command it are too small to demand or desire independence, the British system has proved relatively effective and unobtrusive. Pan-American emphasis on continental land control

<sup>1</sup> The six Central American and three West Indian countries, and Mexico, Venezuela, Colombia, and Ecuador.

and the untraversed land bridge, while the same sea is being used for international intercourse, may be considered less realistic.

However, even ambiguous policy and awkward procedure may attain satisfactory results in world affairs. Good intentions on the part of the United States and common interests in the Western Hemisphere have been made evident. Inter-American cooperation is a valuable asset, whether or not based on accurate judgments of European-American relations. The land bridge and the republican form of government are effective symbols of unity, if nothing else.

Accordingly, Latin America has continued to house a cluster of independent countries in a political world order maintained from the North Atlantic, by proclamation of the United States and tacit agreement of the other satisfied powers. Understandings among powers, expressed or unexpressed, have included freedom of the seas, freedom of economic enterprise, and respect for established rights recognized in the business and political codes of North Atlantic world order (Fig. 506). The United States has had greater interest in the tropical north, by reason of proximity, reciprocal products for trade, and the Panama Canal; Britain has had greater interest in the middle-latitude food-producing south. Yet these regional interests have not excluded British oil companies from Mexico or American meat packers from Argentina. Only in political police action has there been an assumption of exclusive jurisdiction by the United States.

**DANGER.** The long-established system of Latin-American countries, politically independent but economically included in North Atlantic organization, is not necessarily stable or permanent. The arrangement is not completely balanced and reciprocal but has depended on continuance of unequal relations. Economic world order has continued to function as long as established centers of commerce, industry, and finance have continued to act as centers, and peripheral regions to remain peripheral.

In Latin America and elsewhere in the world, great regional inequalities in both land and people are fundamental and relatively permanent. Therefore, unequal relations are inevitable. But particular inequalities of organization, established under temporal circumstances and not based entirely on fundamental regional differences, tend to become unstable in course of time. New centers compete with old, and peripheral regions equip themselves for local control and industrial independence. The system survives after local changes have occurred, but only as long as those interested in maintaining the *status quo* have strength to maintain it.

Established order in Latin America is challenged on two opposite fronts, by dissatisfied interests strong enough to promote changes. One challenge is by local interests in Latin America. The countries have progressed in the ability and ambition to manage their own affairs, to

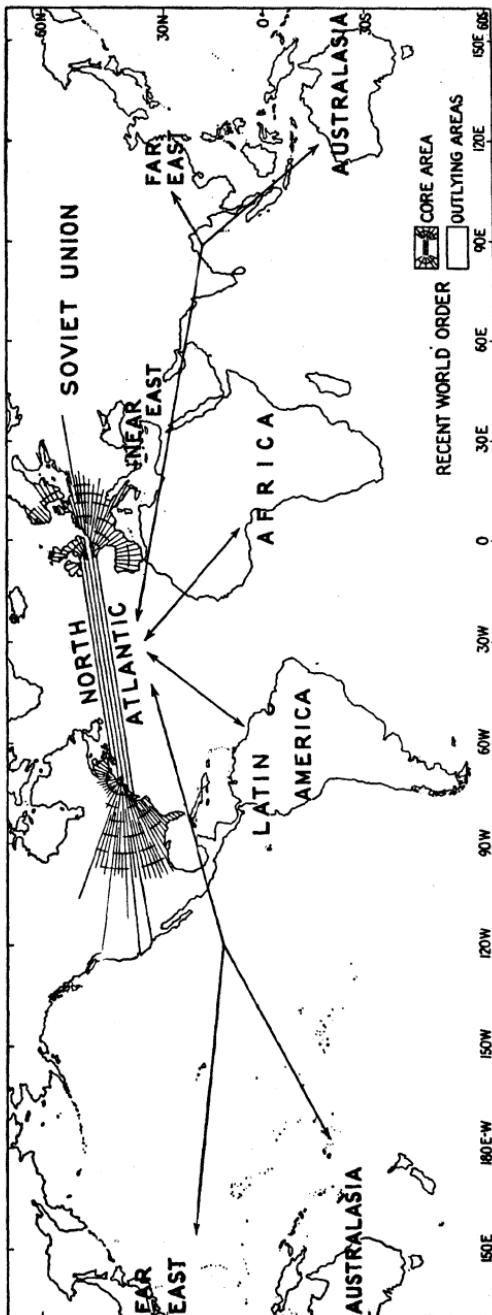


Fig. 506.—The North Atlantic core and outlying areas of world organization in recent times, a global system in which Latin America has had its place. During war the unity of the system is broken but at the same time an evidence of unity appears in the impelling tendency of European war to become world war. The pattern as developed through transportation on sea highways has been emphasized through air transportation on more universal but still restricted air highways. A cylindrical projection still serves almost as well as a globe to represent the traversed world. (*Map on Miller Cylindrical Projection, American Geographical Society, 1942.*)

Alternative possibilities of the postwar period include (1) reestablishment of the pattern with continuance of prewar advances toward democratic decentralisation and federalization; (2) revision of the pattern with imposition of a new totalitarian supercentralization; (3) disintegration of the pattern into two or more zones separated temporarily by balanced power (not the old European balance of power); (4) further disintegration into a world of small weak localities separated by national and international disorganization.

assume economic as well as political independence. Nationalistic policies have been adopted from North Atlantic models. Tariff barriers have been raised, industrial self-sufficiency fostered, and antiforeign sentiment aroused.<sup>1</sup>

Capitals detached from the commercial world and heretofore looking down indulgently on outposts of foreign trade within their borders<sup>2</sup> have become less tolerant of exploitation from abroad and more ready to break up world economic organization along national lines. Also, in some countries, popular revolt against existing order has threatened to upset economic as well as political arrangements.

But such interference with international economic order, through old or new political regimes, has been opposed by commercial interests rising locally and by established North Atlantic powers able to exert political as well as economic pressure on small countries. Therefore, the local challenge has been relatively weak and is overshadowed by the greater threat to existing order from dissatisfied world powers strong enough to strike for world readjustment. Latin-American capitals and sovereignties appear impotent on the outskirts, as old and new centers in the North Atlantic and Pacific settle the issue of continuance or termination of established world order. All aspects of the system under which Latin-American countries have developed as sovereign members of the family of nations, in a world of international intercourse, hang in the balance.

### Outlook for Latin America

Popular American predictions of the future have dwelt upon the great undeveloped resources of Latin America and upon the possibilities of industrial and commercial development, prosperity, and population increase, based on their exploitation.

**MORE PROSPERITY?** Undeveloped resources do exist in Latin America—some belonging to types already used and some to types almost unused heretofore. Used types include, for example, petroleum, iron ore, and water power, of which known resources in inaccessible areas lie unused—petroleum east of the Central Andes;<sup>3</sup> iron ore in the Brazilian and Guiana highlands; water power on rainy “interior”<sup>4</sup> slopes of both western and eastern highlands (Fig. 3, page 11). Types now almost unused include plant resources and farm land of rainy low-latitude areas (Fig. 491, page 487).<sup>5</sup>

The predictions seem to include a common assumption that the system of world economy prevailing in the recent past is to endure in the

<sup>1</sup> Pages 514–515.

<sup>2</sup> Pages 523–524.

<sup>3</sup> Page 508.

<sup>4</sup> For a similar use of the word “interior” see p. 106.

<sup>5</sup> Page 504.

future, that the rising curve of industrialization and exploitation is to continue rising, under conditions of large-scale control by world powers of the established order.

**COLLAPSE?** New expansion and prosperity, under the old order reaffirmed, are still a possibility. But it is not to be expected as a result of continuing trends or hoped for as a simple fulfillment of human desires in the Americas. The intricate mechanism is out of order, beyond hope of satisfactory repair by simple reaffirmation. Other possibilities are more likely to be realized, either for better or for worse.

The superstructure of established order may collapse in our time. Survival is not guaranteed to nations and their political system, to big business and the international economic system, or even to society and organized religion. "The cloud-capp'd towers, the gorgeous palaces, The solemn temples . . . shall dissolve."<sup>1</sup> The contemplation of collapse leads to the pessimistic conclusion of Shakespearean humanism<sup>2</sup> and of modern defeatism.

**FIRM BASE.** But geography and history do not confirm the pessimistic view. Rather, an optimistic outlook is inspired by the perennial vigor of land occupancy and community life and by the confidence and tenacity of people in their homelands. The substance of Latin America (the people, their habitats, and their cultures) is durable to say the least.

Though the superstructure may collapse, the substructure of local organization is still sound—the rural communities, the farms and homesteads, such as have been observed in the preceding field studies.

To be sure, even small units of occupancy are not immutable. The establishments most closely tied to larger kinds of organization are particularly subject to change. These include middle-latitude farms, tropical plantations, and mines.<sup>3</sup> Others may survive almost unchanged through critical periods of time. Farms in high highlands and Indian communities in rainy lowlands have survived from the Pre-Columbian Period through the Colonial Period and Recent Period and show no signs of disappearance now.

Emphasis here on the substructure of local organization is not to imply that the superstructure of international order is unimportant. Nor does it imply that the present organization, or any prospective change for the immediate future, is satisfactory and can be taken for granted. The problem of Latin-American organization is unsolved, and final solution is not to be found either in the sovereign rights of 21 nations or in domination by one imperialism. Moreover, the problem of Latin-American order is inseparable ultimately from that of world order.

<sup>1</sup> WILLIAM SHAKESPEARE, "The Tempest," Act 4, Scene 1.

<sup>2</sup> *Ibid.* "We are such stuff As dreams are made on, And our little life Is rounded with a sleep."

<sup>3</sup> Pages 496, 498, 500, 503, 505, 507, 509.

**GIFTS TO WORLD ORDER.** Even in the face of such problems, during the Second World War and the post war period, there is no need to despair, either of Latin America or of world order. Better times will come, if not soon, then later; and the Latin America of today has contributions to make to a better world order of the future. Certain Latin-American characteristics are of enduring validity and value and will survive after totalitarian principles of world order are past and gone.

For a good life in a peaceful world, there is need of local autonomy of population groups, local management of local affairs, instead of regimentation enforced by a central authority far away. The need springs from the fact that human life is inevitably local and that direct personal contact with a small circle of associates on a reciprocal basis in everyday living is not replaceable by any device of long-range mass organization.

Latin America exemplifies the need and preserves the essential characteristic in its twenty or twenty-one independent countries and its thousand autonomous communities managing their own family affairs. The characteristic is unusually well developed in the high- and dry lands and rainy lowlands, particularly in Indian communities.<sup>1</sup> The "grass roots" of Latin-American democracy, unshaded by rank growth of larger plants above, retain their vigor.

A second need, in providing for a satisfactory life in the world, springs from the fact that localities are interrelated and local life overlaps from place to place and region to region so intricately that there is no complete natural barrier between one part of the world and another. Coordination and cooperation among communities and countries in their common problems is called for. This also is represented in Latin America, not only in the association of communities and regions within countries, but also in the mutual understanding and active association of American nations as a unique group cooperating on equal terms in the common interest.

A third need in the world arises from the fact that there is great variety of nature and culture from region to region, and country to country, with possibilities of exchange for mutual benefit. Latin America displays regional variety to an unusual degree, within as well as among countries; local trade has been maintained since pre-Columbian times; and international trade within the Americas goes on under unusual auspices of cooperative international planning.

A fourth need, for satisfactory life in the world, springs from the fact that the sea and upper air are homelands for no one and highways for all. As a highway system the sea forms a single unit, actually not "seven seas" but one; and the air can be an even more extensive medium of travel. Cooperative use of the sea and air is called for.

<sup>1</sup> Pages 492, 495, 501.

Latin America forms a group of countries unusually dependent on the sea and air to connect them with each other as well as with the rest of the world, a group committed to the free use of the sea by all on equal terms,<sup>1</sup> and cooperating peacefully in use of the air.

Under favorable circumstances, the opportunity to establish a good world order, embodying the contributions of Latin America, may begin when the Second World War ends. Under unfavorable circumstances, the opportunity may come not in our time, but in some future generation.

Postponement of world order until a future generation would seem to afford small comfort to people of the Americas in our time. But even if worst comes to worst and only the "grass roots" remain alive, people of the Americas still need not despair. The Latin-American scene could be no more circumscribed than that of Job,<sup>2</sup> and is no less consistent with greatness and peace of mind and spirit. In the coming period, momentous contributions to the world might come from regions that have had little to give in the recent past—even from such an unsuspected source as high highlands or chronically rainy lowlands.

<sup>1</sup> Pages 528–530.

<sup>2</sup> Old Testament, Book of Job, Chaps. 1, 19, and 38.



# Glossary

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(The meanings given are those of the text)

*adit.* Horizontal mine entrance.

*adobe.* Sun-dried brick.

*agave.* A plant genus including the century plant, maguey, and henequen.

*agreste* (ä grä'stä). Bush vegetation.

*agrestic.* Pertaining to rural or farm life.

*aguardiente.* A distilled beverage from sugar cane.

*alidade.* A sighting instrument for map making.

*alpaca.* Domestic animal of Andean Indians, useful for wool.

*ambiente simpático.* Congenial atmosphere.

*angostura.* Narrow place.

*annatto.* Red dyestuff from the fruit of a small tree.

*anticline.* Upfold in geologic structure.

*arroyo.* Water course.

*balata.* A tropical forest gum.

*balsa* (bäl'sä). Raft; light wood.

*barbasco.* Root source of rotenone, an insecticide (Peruvian).

*barranca.* Valley slope or bluff.

*bauxite.* Aluminum ore.

*bayou.* Secondary channel, generally sluggish.

*beneficio.* Coffee-drying establishment.

*boca.* Mouth.

*bodega* (bō dā'gä). Winery; storehouse.

*breadfruit.* A starchy fruit, cooked for eating.

*burro.* Donkey.

*caatinga.* Dry bush vegetation.

*cabaña* (cä bän'yä). Herdsman's habitation.

*cacao* (cä cäö'). Source of cocoa and chocolate.

*cacaotal* (cä cäö täl'). Cacao plantation.

*cadastral.* Pertaining to property ownership.

*cafetal* (cä fä täl'). Coffee plantation.

*caliche* (cä lē'chä). Nitrate ore.

*calzada.* Road.

*campo.* Field, unwooded land.

*cañada* (cän yä'dä). Small valley.

- canuco* (kā' noo'cō). West Indian subsistence farm.
- capoeira* (cap wā'rā). Second-growth woods.
- carnauba* (cár nā'ō'bā). A palm yielding wax from leaves.
- casa grande*. Large house, mansion.
- cashaça* (cā shā'sā). A distilled beverage from sugar cane.
- cassava*. A starchy root crop, manioc, mandioca.
- castanha* (cās tān'yā). Brazil nut.
- castanhal* (cās tān yāl'). Grove of Brazil-nut trees.
- castilla* (cās tēl'yā). A rubber tree of secondary value.
- caucho* (cou'chō). Peruvian castilla rubber.
- cay*. A low islet.
- cenote* (sā nō'tā). Sinkhole, water hole.
- central* (cēn trāl'). Large centralized mill.
- cerro*. Hill.
- chaco* (chā'co). Hunting ground.
- chacra*. Small farm of a tenant or laborer.
- chaparro*. A small tree of tropical savannas.
- chernozem*. Dark soil with limey subsoil of subhumid grasslands.
- chili pepper*. Red pepper, fruit of a garden plant.
- clone*. Plant stock propagated vegetatively.
- coca*. A bush crop, source of cocaine.
- colonia*. Colony; farm subdivision.
- colono*. Colonist; worker cultivating a small farm.
- cordillera*. Major mountain range.
- corrales*. Places for livestock.
- criollo* (crē öl'yō). Of local stock.
- cul-de-sac*. Blind alley.
- curaca* (cōō rā'cā). Head man of an Indian group.
- curare* (cōō rā'rā). A paralyzing drug made of herbs by forest Indians.
- dasheen*. A tropical root crop.
- divi-divi*. Pod of a small leguminous tree, used for tanning.
- drift*. Horizontal passageway in a mine.
- edaphic*. Pertaining to local soil conditions.
- empoldered*. Enclosed by dikes.
- entrepôt*. Transit port.
- Eocene*. First geologic period of the Tertiary era.
- estancia*. Landed estate for livestock.
- estrada de ferro*. Railway (Brazilian).
- fazenda*. Large landed estate (Brazilian).
- fazendero*. Owner of a fazenda.
- ferrocarril* (fér ö cár ēl'). Railway.
- finca*. Small rural property.
- frijoles* (frē hō'lās). Beans of the kidney type.
- fundo* (fōōn'dō). Rural property.
- geosyncline*. Downfold of geographic proportions in geologic structure.
- Gran Chaco* (grān chā'co). Great hunting ground.
- guano*. Fertilizer of bird droppings.
- guinea grass*. A tropical fodder grass.

- haba* (ä'bä). A bean of the lima type.
- hacendero*. Hacendado, owner of an hacienda.
- hacienda*. (ä cē ĕn'dä). Large landed estate.
- hardpan*. Consolidated layer in unconsolidated ground.
- hatico* (ä tē'co). Small farmstead.
- henequen*. An agave fiber crop, sisal.
- herval* (är vä'l'). Yerba mate grove (Brazilian).
- hevea*. Chief Brazilian rubber tree.
- ilha* (äl'yä). Island (Brazilian).
- imbuye*. A cabinet-wood tree.
- intermontane*. Between mountain ranges.
- isla* (ës'lä). Island.
- jangada* (zhän gä'dä). Sailing raft (Brazilian).
- laterite*. Red leached soil of low-latitude forest climates.
- latex*. Plant fluid.
- latifundian*. Pertaining to large landed estates.
- leche caspi* (lä'chä cas'pē). A forest gum, "tree milk."
- liqueur*. An alcoholic sirup.
- llama* (yä'mä). Domestic animal of Andean Indians, useful for burden bearing and wool.
- llanero* (yä nä'rō). Herdsman of the Llanos.
- lano* (yä'nō). Open plain.
- machete* (mä chä'tä). Cutlass.
- maguey* (mä gä'). An agave, like the century plant.
- majoca* (mä hö'cä). A root crop of the Andes.
- major-domo*. Manager of an establishment.
- mandioca*. Same as cassava (Brazilian).
- mango*. A juicy tropical fruit.
- manioc*. Same as cassava.
- mate* (mä'tä). Paraguay tea.
- matte* (mä'tä). Mate (Brazilian).
- matto alto*. High forest.
- maxua* (mä'shoo'ü). A root crop of the Andes.
- meseta* (mä sä'tä). Tableland.
- metate* (mä tü'tä). Grinding stone.
- metes and bounds*. Landmark measurements for locating boundaries.
- mijoca* (mē hö'cä). A root crop of the Andes.
- milpa*. Small cornfield.
- Miocene*. Second geologic period of the Tertiary era.
- montaña* (mön tän'yä). Forest land.
- monte* (mön'tä). Grove of trees.
- morabin*. A shade tree of Haiti.
- moriche* (mo rē'chä). A palm with fibrous leaves useful in weaving.
- oca*. A root crop of the Andes.
- oficina* (ö fē së'nä). Nitrate plant.
- oleander*. A tropical flowering shrub.

*ombu*. A treelike shrub of the Humid Pampas.

*orienté*. Eastern regions of the central Andean countries.

*paiche* (pi'chā). Same as pirarucú (Peruvian).

*pampa*. Open plain, grassy, bushy, or desert.

*panela* (pā nā'lā). Brown sugar in cakes.

*papaya* (pā pī'yā). A tropical fruit, source of papain, a digestant.

*Papiamento*. A dialect of the Netherlands West Indies.

*páramo*. High wind-swept pastures.

*paraná*. River channel.

*pasto imperial*. A tropical fodder grass.

*peccary*. Wild pig.

*pepper tree*. A small leguminous tree.

*petit mil*. Grain sorghum.

*pirarucú* (pē rū rōō cōō). A large fresh-water fish (Brazilian).

*placer* (plā'cēr). Unconsolidated mineral deposit.

*plantain*. A starchy fruit related to the banana, cooked for eating.

*podsol*. Acidic soil of cool humid forest climates.

*pongo*. Narrows, water gap.

*potrero* (po trā'ro). Planted pasture.

*pueblo* (pwēb'lō). Village; group of people and their land.

*pulque* (pōō'l'kā). A fermented beverage from maguey.

*puna* (pōō'nā). Bleak heights in the Andes.

*quínoa* (kē'no ī). A small grain of the Andes.

*rancho*. Ranch, small farm.

*regolith*. Unconsolidated material overlying bedrock.

*rio*. River.

*roçado* (rō sā'dō). Small farm clearing.

*ruinate*. Neglected.

*sabana*. Savanna, grassland.

*sapote* (sü pō'tā). A sweet tropical fruit.

*savanna*. Tropical grassland.

*schist*. Foliated crystalline rock.

*selva*. Rain forest of broad-leaved evergreen trees.

*serra*. Mountain range (Brazilian).

*sertão* (sär tō'). Unoccupied wild land.

*sierra*. Mountain range.

*sisal*. An agave fiber, henequen.

*sitio*. Countryseat.

*steppe*. Grassy plain in a cool climate.

*stope*. Excavation for extraction of ore in a mine.

*stride scale*. Scale for measuring distance by counting strides.

*sudan grass*. A subtropical fodder grass.

*tagua* (täg'wā). Vegetable ivory, a palm nut.

*tailings*. Waste material separated from ore in a milling process.

*tambo*. Dairy farm; inn.

*Tanguis.* A long-staple Peruvian cotton.

*taquia* (tă'kē ē). Dried llama dung, used for fuel.

*tequila* (tă kē'lă). A distilled beverage from an agave.

*terreno* (tĕr'ā'nō). Land.

*terreno gomífero.* Rubber-bearing land.

*Tertiary.* A geologic era represented by relatively young rocks.

*tierra caliente* (tĕ ā'ră că lē ān'tă). Hot land, lowlands in low latitudes.

*tierra fría* (fré'a). Cold land, cool highlands in low latitudes, high highlands.

*tierra helada* (ă lă'dă). Frozen heights.

*tierra templada* (täm plă'dă). Land of mild climate, warm highlands in low latitudes, low highlands.

*timbó.* Same as barbasco (Brazilian).

*tola.* Resinous bush of the central Andes, used for fuel.

*tonka bean.* Seed of a tropical tree, used for perfume.

*tortilla* (tōr tĕl'yă). Pancake of cornmeal.

*trapiche* (tră pĕchă). Sugar mill and plantation.

*viña* (vēn'yă). Vineyard.

*xerophyte.* Drought-resistant plant.

*yerba mate* (yĕr'bă mă'tă). Paraguay tea.

*zapote blanco* (să pō'tă blän'cō). A sweet tropical fruit.

*zebu.* Humped cattle from India.



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